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Engineering News-Record

A Consolidation of Engineering News, Engineering Record, The Sanitary Engineer, and The Contractor

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DEVOTED TO CIVIL ENGINEERING AND CONTRACTING

F. E. SCHMITT, *Editor*

Volume 103 NEW YORK, JULY 4, 1929 Number 1

A Lasting Opposition

COURAGE was needed to discuss before engineers and industrial men the conflict between standardization and individual initiative or creativeness, the theme of G. W. Thompson's presidental address before the American Society for Testing Materials last week. Such a theme calls for courage, because the conflict is one which can never be made to disappear but must always remain by the very nature of things. The lockstep of standards will ever hamper the free ranging of thought and creative endeavor. And the converse is equally true —the individual's imaginative freedom will never fully serve the mass purposes and necessities of human society. When the nature of this opposition is fully understood, however, both the place of standards and their proper limitation become fairly clear. It is then evident that standardization for purposes of mass production to serve specific human requirements (Dr. Thompson carefully emphasized this latter limitation) is notably important to progress, and equally evident that any extension of standardizing efforts beyond this field is likely to bring about a serious loss to the world. In the wise guarding of this defining limit of standardization lies one of the great responsibilities of the organization which Dr. Thompson addressed. It is one of the fundamentals of its faith.

Fundamentals and Cement

THINKING back to fundamentals is something that every society can do with profit from time to time. An occasion is furnished to the American Society for Testing Materials through the action of its cement committee last week. Having procrastinated during many months in the matter of recognizing the commercial position of high-early-strength portland and its reaction on the demand for changed quality in normal portland, the committee last week set to work in belated haste and achieved a radical upset of the current standard cement specification—a change which if consummated will affect engineering practice the country over and may influence the whole future of the concrete art. Though such an action is of intimate concern to the society as a whole, yet the committee chose to withhold its conclusions from the society's knowledge, and rendered an innocuous report which concealed rather than revealed what it was doing. Further, it made plans to have the new specification take effect as tentative standard by the first of next year, without giving the society's membership opportunity to consider the subject. This is a far departure indeed from the principles of the society's early days, when it was recognized that every important specification is bound to rest on the general acceptance and confidence of the profession. It is time indeed for the society to consider the nature of its standardizing methods if it would retain that broad cooperative support of the engineering field on which its permanence rests. There is a fair chance that the precipitately drafted new specification will be given more deliberate study and broad discussion before it is promulgated. But simultaneously the society may well look upon its own state, and recognize the destructive absurdity of cloaking committee proceedings with old-fashioned Senatorial secrecy.

Gasoline Taxes Running Wild

A RECORD in gasoline taxation appears to have been made in Florida. The legislature on June 20 increased its five-cent tax to six cents and on June 21 Governor Carlton put his signature to the act. Florida now has a gasoline tax as high as has South Carolina, which recently boosted its rate one cent a gallon. In Florida, however, the additional cent is not for road improvement, but for the support of "public schools and higher institutions of learning." By the new Florida gas tax law also the five-cent road tax is to be divided by an "administrative board" between the state and the counties, which are to use their share in "paying off their bonded indebtedness of nearly $200,000,000." Florida has gone ahead even of Alabama, in which three counties by act of legislature have been given power to add a three-cent county tax to the four-cent state tax. The situation is menacing. If the state legislatures continue to pile additions onto gasoline taxes and to divert the receipts to bolster up every state and county activity that finds itself impoverished, there will follow an aftermath of revolt and retrenchment which will be hazardous to progressive highway improvement. As a special impost for road construction and upkeep the gasoline tax has been extraordinarily favored by the people and passively accepted by the trade interests subjected by it to a heavy sales-tax burden. There are indications that endurance is being too severely tried for further patience, and state highway authorities should take positive action to influence wiser legislative policies.

To Gain More Light

THIS summer a further attempt will be made, it is reported from Washington, to diagnose the condition of irrigation development in the West by means of an economic survey of a number of federal reclamation projects. There have been several studies of the kind heretofore, notably the elaborate investigation of five years ago which produced what is called the fact-finders' report; yet it is open to question whether the fundamental difficulties of land development were touched in any measure by these studies. The present inquiry is laid out on a broader basis. It will seek to determine whether the projects studied are intrinsically unable to pay their cost or whether they can be made solvent by some plan of money loans or other assistance to the cultivators. In addition it will give similar attention to a number of new projects that have been proposed

by local interests, in order to throw light on the wisdom of a plan for making the states in which these projects are located responsible for their settlement and success. This is a particularly promising element, for the possibilities of state and federal co-operation in reclamation are potentially great, yet have never been put to the test of trial. Recent years have seen land development by irrigation losing credit progressively, through a combination of imperfect organization, optimistic planning and reckless financial method. It can be restored to standing, but only by sufficiently penetrating study to reveal the controlling factors of the problem, which today are far severer than those of the earlier generation when reclamation was begun.

Comparable Bids

WHERE bids for public works give purveyors of rival materials or methods opportunity to compete, much figuring is sometimes required to reduce the bids to a properly comparable basis. Even when a capable engineer makes the calculations and is satisfied with his conclusions, layman officials and interested citizens may have to take it for granted that the best bid has been selected. This has often been true where bids on different kinds of water pipe have been invited, particularly in the case of large supply mains involving different materials which may give different carrying capacities unless size or other adjustments are made. A simple way of obviating the need for computations, at least on relative capacities, has been adopted in the case of a 42-in. pipe line for the water-works of Hartford, Conn. Tenders for cast-iron, steel and concrete pipe have been invited, with provision that both of the first two shall be cement-lined, thus making them relatively comparable with each other and with the concrete pipe. The general principle here followed is worthy of consideration generally on this and some other classes of work.

Brightening Prospects

WHAT to do with the sludge from sewage-works is still a question. It is even more of a problem at the general run of activated-sludge plants than at those using plain or septic sedimentation. If the excess sludge of the activated process is dried to 10 per cent moisture for sale as fertilizer, getting rid of the final product by sale is easy at the few places where drying is practiced, but the drying plant is expensive both in capital and operating charges and many physical difficulties are met —or have been until quite recently. The disposal of wet activated sludge is much more likely to be a nuisance than that of sludge from settling tanks. Small activated-sludge plants can hardly go the whole length of drying. Wet disposal is necessary. At San Marcos, Texas, land disposal by furrowing and covering has recently been reported as entirely satisfactory. This general method has long been used with apparent satisfaction for sludge from the settling tanks of Birmingham, England. It is worthy of attention elsewhere, particularly for wet excess activated sludge. For a large activated-sludge plant, plow burial might present difficulties on account of the area of land required. At one or two North Carolina cities a betwixt-and-between method is employed; excess sludge is passed through a vacuum type of so-called filter and then, still relatively high in moisture but greatly reduced in bulk, is got rid of on land, being distributed by manure spreaders and plowed under. These and other facts well known to sewage-works engineers afford fresh illustration of the fact that the sludge disposal problem is still with us, just as it was decades ago. Fortunately progress has been made and more is in prospect. Ways and means to choose from, for adaptation to local conditions, are increasing, as also both scientific knowledge and everyday practice as to means of control when difficult sludge is encountered.

Water-Works Changes

A FEW decades have seen great changes in public water supplies. Besides the vast increase in number of water-works and population supplied, nearly everything that enters into the design and construction of water-works, including materials and equipment, has undergone a change. Neither water purveyed, the purveyors nor the consumers are what they were 40 or 50 years ago.

Consider first the water. If Nature has not changed it, man and his works have. The wastes of cities and industries have polluted it, and even remote mountain streams are subject to defilement and danger from motor, tramping and camping, hunting and fishing parties. Meanwhile water consumers have been more and more exacting in their demands for water free from color, odor, taste, turbidity, hardness, extreme softness, iron and manganese. Treatment is meeting some of these demands, but here as elsewhere every advance shows new possibilities that must be realized, while increase in knowledge reveals new depths of ignorance.

Fifty years ago most Americans took their water raw—just as Nature and man make it. There was practically no purification anywhere in the United States or Canada. Poughkeepsie and Hudson, N. Y., had slow sand filters. There were no mechanical filters. Some turbid waters were improved by sedimentation; some colored waters were bleached by storage exposure. In both cases bacteria were reduced, but at that time few water consumers knew that bacteria existed and scientists had only begun to realize that some of them were a danger to man. Today water purification is common and water softening is gaining.

Columns of space would be required to outline changes in water-works methods, materials and equipment that have come in half a century. The changes run through the whole plant, from drains, reservoirs, pumps, tanks, pipe and accessories to the consumer's fixtures to which water is finally supplied. To mention only one but a most important element in a water plant which has been profoundly changed, the pump and its motive power illustrates this advance. The ponderous reciprocating pump has largely been displaced by the small and lightweight centrifugal pump, with the electric motor or the internal combustion engine as the driving force. Here, too, further advances are to be expected.

As in other fields of engineering, so in water-works no small part of the advance has been due to the professional organizations which serve as forums and clubs for the exchange of knowledge and experience. To those who attended water-works conventions 40 to 50 years ago the change from then to now in the meetings is almost as striking as the changes in water-works design, construction and operation, Instead of a more or less chance assemblage of papers, there is a well-ordered grouping by topics, planned to serve as milestones of progress in the various portions of the water-works

field. Such was notably true of the Toronto convention of the American Water Works Association, as may be seen from the proceedings reported in this issue.

Water-works personnel has been a significant element in the water-works changes of the past few decades. In earlier days there were but few engineers in water departments, and few at the water-works conventions. Most of the latter were in private practice. Today, engineers and trained men of other professions are well represented on many water-work staffs and are conspicuous by their presence at water-works conventions and by the part they take in the proceedings. This explains much of recent water-works progress and gives high promise for the future.

Bidding Under Cost

INTROSPECTION is becoming popular in contracting. Association publications widely are speaking of bad habits which must be corrected by contractors themselves. At present low bidding is receiving emphasis. The choice of terms is significant; it implicates the contractor as the responsible agent. This is a wholesome change of thought which has too long been contemplating low contract prices as a business condition imposed on contracting from the outside.

With the new attitude of mind, sounder reasoning should prevail. Contracting remains a virile business despite its ills. All contracts are not unprofitable and all unprofitable contracts are not the consequence of low prices. The observer does not have to look far to discover numerous operations, both large and small, which have brought profits to the contractor. All were undertaken on a low bid, few of them carry the suspicion of profit through poor work and there are too many to justify the conclusion that all were lucky one-time gambles. And again, where contractors have gone under, many of the failures have patently been due to inexperience, carelessness, bad luck, organization dry rot or dependence on routine planning and methods instead of keen invention and ingenuity. The price was not the trouble.

Contract prices are admittedly low. Bidding, on the average, is too close to costs for continued stability of the contracting business. This is not the conclusion of contractors alone. Engineers and directors of public works are asserting the fact. In roadbuilding particularly there is constant concern and worry for highway officials in the present low level of bidding prices. They see in them delays and defaults and the need continually of closer inspection and more rigid specifications. Even in estimating, as a capable state highway engineer stated recently, trained department estimators "are made to look foolish" by the bidding prices set by contractors. It has become common for state highway officials to announce that the year's road construction was contracted at prices millions lower than the engineers' estimate of reasonable cost.

Such price confusion is not so irrational as may be concluded. Cost estimating is not an exact process, yet an estimate of cost is definite and calculable compared with deciding on a bid that will secure a contract when competition is keen. Purveying construction service is a marketing procedure and not an engineering calculation. Price and business advantage are often not correlative. A dozen tangible and intangible influences make a profitless bid for one contractor a reasonable bid for another contractor. Obviously there is a level of contract prices below which contracting cannot continue to exist as a profitable business; this datum fluctuates with market conditions and with advances in construction technique and equipment. The weight of opinion as indicated is that the low level now exists, and thereby contracting is not in a healthy condition.

Accepting the diagnosis, the cure lies definitely with contracting. Time payment evils, cut-rate practitioners, easy surety bonds, day-labor competition, broad lien privileges and other influences have a part in keeping bids down, but the contractor can dominate all these, for he is at once the customer who sets the standard of these services and the merchant who names the price of the goods he sells. Contracting need neither buy nor sell at other than its own terms.

Today the contracting business is habitually buying at the lowest standards that other agencies can be induced to set and is selling in many cases at prices established by its least responsible practitioners. The weakness of contracting is precisely the fact that its price practices are controlled by the irresponsible and speculative elements of the business. The occurrence occasionally of a low price determined by bold ingenuity in planning a specific operation does not affect general price levels. It is the task of contracting alone to convert or to cast off its irresponsibles.

There is hopeful recognition of this obligation in the new thinking of the contractors' associations. So far they are relying mainly on preachment to convert their members, but at least exhortation to keep the gospel strong in the home circle is better than condemning the irreligion of the neighbors. Stronger and more direct educational and coercive action is needed. Contractors must employ both to teach contracting to be a sound business. It is not at present a sound business judged either by its average earnings or by its solidarity of principle. There are strong bodies of contractors that meet every qualification of skill, integrity and responsibility, and on them rests the obligation of bringing to the same level the greater number of their vocation. Then the low bidding problem will solve itself.

Volume 103—*Engineering News-Record*—Number 1

Engineering News-Record is a consolidation of Engineering News and Engineering Record, effected in 1917.

Engineering News was founded in 1874 by George H. Frost, as The Engineer and Surveyor, which title subsequently became The Engineer, Architect and Surveyor, then Engineering News and American Railway Journal and finally Engineering News, under the successive editorships of D. McN. Stauffer, Arthur M. Wellington and Charles Whiting Baker.

Engineering Record was established in 1877 by Henry C. Meyer as The Plumber and Sanitary Engineer. The name was subsequently changed to The Sanitary Engineer, Engineering and Building Record, and, finally, to Engineering Record. During his ownership of the paper Mr. Meyer was directly responsible for the editorial policy. John M. Goodell became editor in 1902, and was succeeded in 1913 by E. J. Mehren.

The Contractor was consolidated with Engineering News-Record in 1918.

E. J. Mehren became editor of Engineering News-Record at the time of the consolidation in 1917, and was succeeded by the late Frank C. Wight in 1924. In July, 1928, F. E. Schmitt was appointed editor.

The staff of Engineering News-Record consists of—

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Simultaneous Steel Erection and Basement Excavation on 40-Story Building

Union Trust Building in Detroit With Second Floor Banking Room 43x150 Ft. Involves Unusual Structural Details—Heavy Trusses—Concrete Slab Floor of 47½ Ft. Span

By W. S. Wolfe,
Chief Structural Engineer,
Smith, Hinchman & Grylls, Architects, Detroit, Mich.

THE NEW Union Trust Building now nearing completion will be the second tallest building in the city of Detroit, rising 40 stories with the top of its tower parapet 486½ ft. above the pavement.

The building is rectangular in plan on a plot approximately 80x270 ft. On the second floor there is a large banking room 43 ft. wide and 154 ft. long without columns. Directly below this, on the first floor, is another room with a similar unobstructed area, while above the main banking room, which has a ceiling height of 46 ft., are large trusses supporting the 26 stories of office floors above. Fig. 4 shows the framing plan for a typical office floor, while in Fig. 3 is given a typical framing cross-section taken through the banking room.

Foundations—The steel frame is supported on 72 caissons extending to bedrock approximately 125 ft. below the street. These caissons vary in size from 5 ft. 6 in. to a maximum of 9 ft. 3 in. in diameter.

FIG. 1—UNION TRUST BUILDING, DETROIT, MICH. Rising 40 stories, it is the second tallest building in the city.

FIG. 2—PLACING CENTERING FOR BANKING ROOM CEILING CONSTRUCTION

The site was excavated to only a short distance below the first floor, from which level the caisson shafts were started. Before sinking the caissons twenty-three 6-in. holes were put down with a well driller, the casings around these holes being driven to bedrock and the holes drilled into the rock until a flow of sulphur water was encountered. Cement grout was then forced down the casings and into the crevices in the rock under pressures as high as 100 lb. per sq.in. One of the holes took as many as 800 sacks of cement, and a total of 3,570 sacks was used for all the grout holes.

Normally when caissons are put down in Detroit no serious difficulty is encountered with water until the shafts have penetrated a considerable distance into the hardpan which lies above the rock and varies in thickness from 6 to 20 ft. Occasionally some water is found a short distance above the hardpan, but a large flow is almost always encountered when the rock is reached. This water, which is dark and has a sulphur content, seems to come up through crevices in the rock, and the object of the grouting operation was to fill these crevices with cement grout and thus retard the flow of water into the caisson wells.

The caissons were put down as open wells for a considerable distance. Then they were concreted, leaving

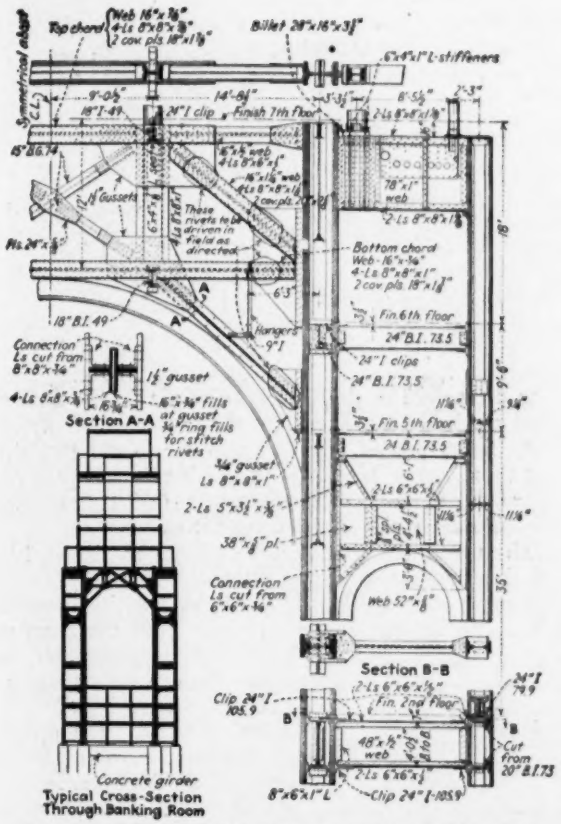


FIG. 3—DETAILS OF TRUSSES ABOVE BANKING ROOM

Note also the typical framing cross-section taken through the banking room. On the truss detail the rivet groups marked "to be driven as directed in the field" were driven successively as the loads were applied in order to relieve any secondary stresses.

a hollow shaft in the center, the concrete stopping a short distance below where the column bases would rest. From this level a steel shaft extended to the top of the well where the air lock was located. With this lock in place, excavation was continued below the concrete, using air pressure when and as necessary.

The grouting operations were successful in that they permitted the sinking of the caissons with an air pressure in most cases of only 18 or 20 lb. per sq.in., while at a near-by job pressures between 40 and 50 lb. per sq.in. were not uncommon before grouting was used.

One of the old buildings at the south end of the site was occupied until most of the new foundations were in. The old walls and foundations were shored as necessary while the new foundations were put in below.

Basement Excavation—The caisson shafts were concreted only up to the proper level to receive the column bases, or about 35 or 40 ft. below the bottom of the general excavation, which had been carried only a little below the first floor level. In this way practically all shoring of banks was eliminated and the time required to excavate the basements saved. When the pouring of the caissons was finished, the grillages and billets were set and steel erection begun. The lowest level of complete beam framing that could be put in at this time was at the first floor. As soon as the steel work was up high enough to avoid interference, the basement walls were put down in vertical sections by trenching; the necessary trench jacks were left in place until the basement floors were poured and the basements excavated with a small electric shovel. The erection of the steel work continued and the outside portion of the first

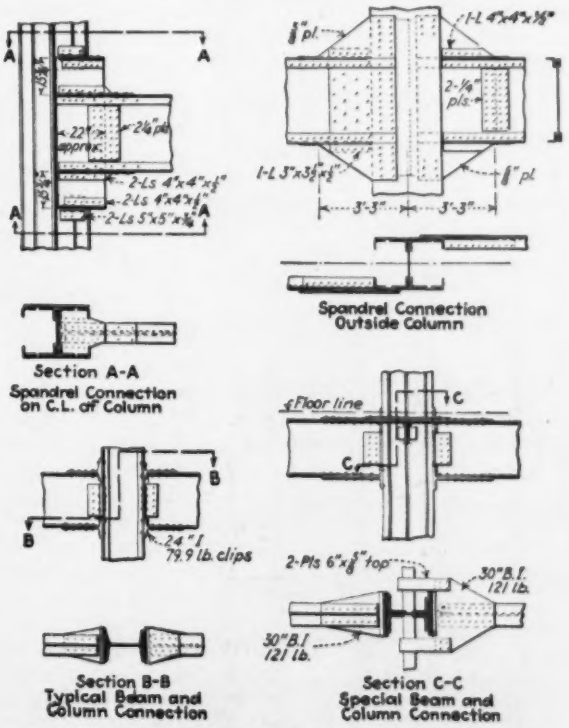

Section A-A
Spandrel Connection on C.L. of Column
Spandrel Connection Outside Column
Floor line
24" I 79.9 lb. clips
2-Pls 6"x⅝" top
30" B.I. 121 lb.
Section B-B Typical Beam and Column Connection
Section C-C Special Beam and Column Connection

FIG. 5—TYPES OF WIND BRACING CONNECTIONS, UNION TRUST BUILDING, DETROIT

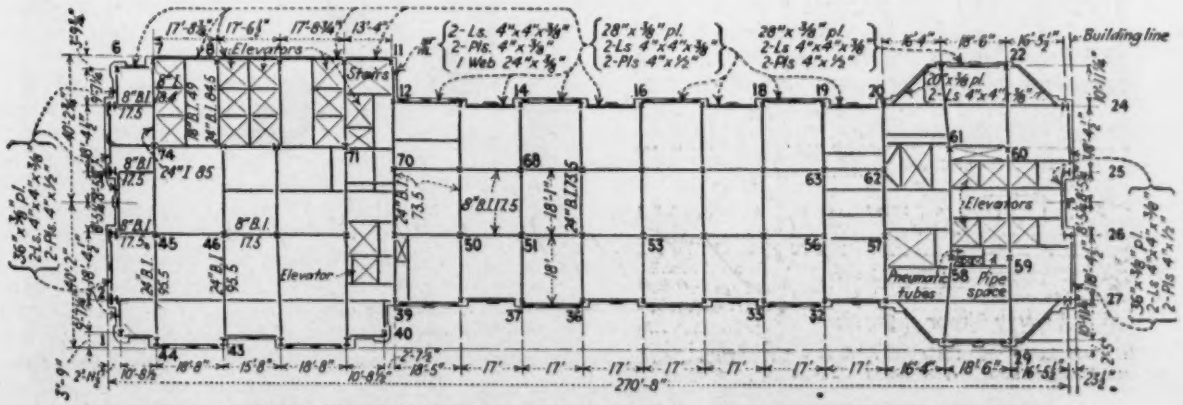


FIG. 4—FRAMING PLAN FOR TYPICAL OFFICE FLOOR—UNION TRUST BUILDING, DETROIT

floor was poured, thus providing support for the upper part of the wall.

As the excavation of the first basement proceeded, the first basement steel was brought in and erected as soon as the shovel was out of the way. The outer panels of the basement floor were then poured in order to support the basement walls at this level and the shovel proceeded to excavate the second basement, followed by steel erection and concreting for the second basement floor.

During all this time, steel erection was proceeding on the upper part of the building, as was also the concreting of the upper floors. The short interior columns extending from the first floor down (Fig. 3), together with the beams framing into them, were supported by temporary hangers, the columns being spliced just below the first and also the second basement floors so that they could be erected a story at a time, going down. With the third basement excavated, trenches were dug and the large girders for supporting these short columns were poured. The third basement steel was also put in and the third basement floor poured as soon as possible, in order to provide support for the bottom of the basement walls.

By the time the third basement excavation was completed, the steel work was erected to the 34th floor and concrete was poured up to the 27th floor.

Structural Features

Banking Room Trusses and Details—Above the main banking room there are a number of large trusses which support the 26 office floors. As may be seen from Fig. 3, the gussets in these trusses are large and some of the members are short. The secondary stresses were therefore an important consideration, and in order to relieve them the rivets in six connections were driven in three different groups. One group (at the extreme ends of the members) was driven when the general riveting at the truss level was done. Later, after considerable load was on the trusses, an adjoining group was driven. The third group was not driven until the steel work above was all erected and most of the concrete floors poured. It was also considered that driving these rivets in groups as the load was applied resulted in a more even distribution of stress among the different rivets in the connections.

The main members of these trusses consist of built-up H sections with cover plates. Approximately half the metal is in the H and the other half in the covers which are outside of the gussets. Thus there are not only double gussets but the rivets through each gusset are in double shear.

An unusual arrangement of bracing is used at the sides of the banking room as shown in Fig. 3. Of special interest is the connection of the second floor girder to the interior column where the capacity of the girder is developed by heavy I-beam stubs instead of brackets.

Above the main lobby at the sixth floor level are several columns carrying loads of over 3,000,000 lb. each. It was necessary to offset these columns a little more than 6 ft., and because there was not depth enough directly above the lobby for girders under these columns, cantilever trusses with large double gussets and other unusual details, as illustrated in Fig. 6, were used. At this same level two heavily loaded wall columns are offset in order to avoid interference with the main entrance. Both of these columns are supported on one large girder (Fig. 6). This girder has one heavy center web for its full length and at each end where the shear is very large, two auxiliary webs. The auxiliary webs are outside of the flange angles, thus putting the rivets which connect the flange to the webs in quadruple shear. It was impossible in the depth of the girder to get enough

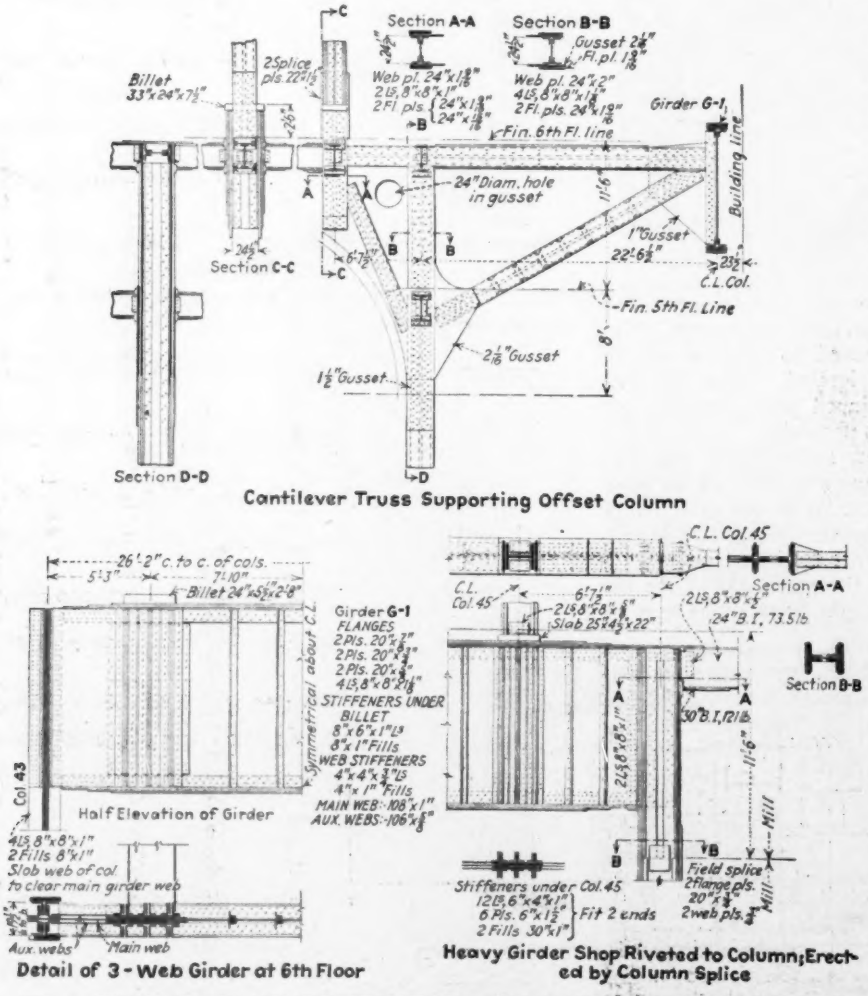


FIG. 6—HEAVY TRUSS AND GIRDER DETAILS—UNION TRUST BUILDING, DETROIT

Cantilever truss carries offset column at sixth floor on account of lack of headroom for girder. Note in lower left detail the girder with two auxiliary webs and a main web which passes through a slot in the web of the supporting column.

single shear rivets connecting the girder to the supporting column to take the reaction. The column webs were therefore slit and the main girder web extended through so that another pair of connection angles could be used on the far side of the columns.

Another large girder which supports a heavy column is also shown in Fig. 6. The heavy end of this girder frames into the flange of a large column. The reaction was too heavy for an ordinary connection having rivets in single shear. The main web of the girder was therefore extended and a short length of column built on to the end of the girder in the shop. The field connection was then just an ordinary column splice shown just below the bottom of the girder.

Wind Connection—In order to provide a strong moment-resisting column in a direction parallel to the end of the building and in order to furnish convenient connections for the spandrel beams, columns of section as shown in Fig. 5 were used at the ends of the building. One of these details shows the connection of the spandrel on the column centerline, while the other shows the connection of the typical spandrel which alternates first on one side of the column and then on the other.

When a bracket or stiff connection is provided at the ends of a beam framing between heavy columns the beam tends to act somewhat as a fixed beam. In other words, wind bracing connections take moment from the gravity loads because the beams act more or less as continuous beams. This gravity load moment is decreased in some connections and increased in others by the wind moment when the wind blows in any one direction. The connections in this building were designed for moments obtained by adding together gravity load moments and wind moments.

A typical wind bracing connection with I-beam clips is shown in Fig. 5. The gravity load moment always produces tension at the top and compression at the bottom, but the wind moment may produce either tension or compression at either top or bottom depending upon the direction of the wind. The maximum stress which can be produced at the bottom is therefore compression and the maximum stress which can be produced at the top is tension. One large reinforcing bar was therefore added on each side of the columns at the top to help in taking the tension, while at the bottom additional rivets were added connecting the I-beam stubs to the beam flanges in order to take the compression. A connection which carries not only a heavy gravity load moment but in addition a large wind moment, making it advisable to tie across at the sides of the column with plates just below the top of the floor slab is also shown in the illustration Fig. 5.

A wind load of 20 lb. per sq.ft. was used for the entire height of the building for designing the wind bracing and working stresses were increased 33⅓ per cent for places where wind governed. A small scale framing elevation of one end

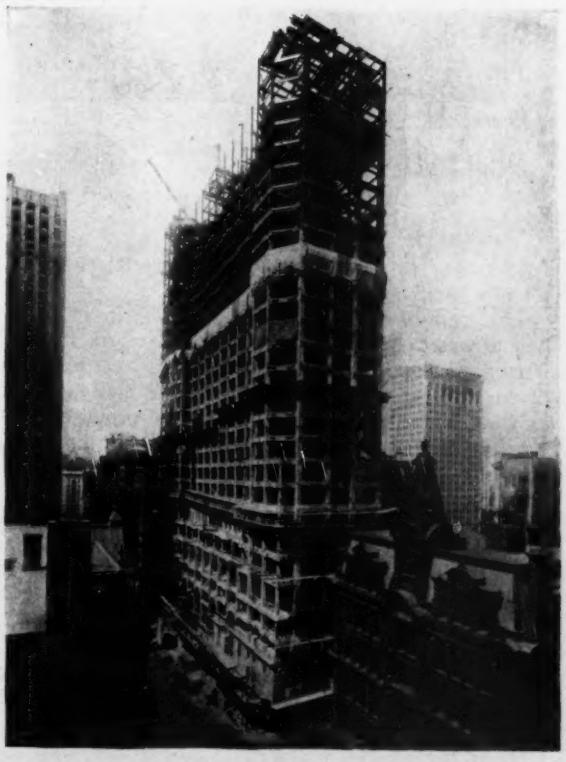


FIG. 7—UNION TRUST BUILDING, DETROIT, UNDER CONSTRUCTION

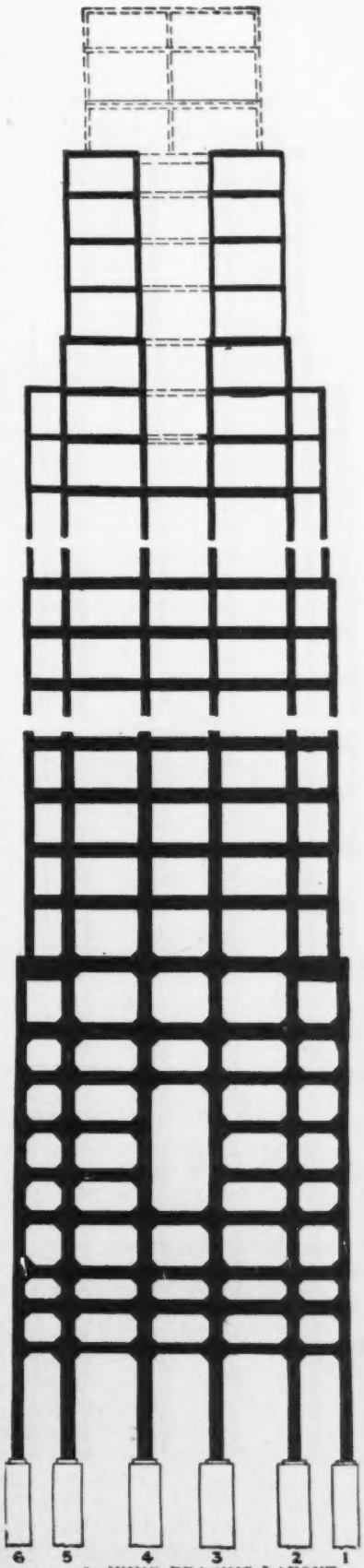


FIG. 8—WIND BRACING LAYOUT ON ONE END OF UNION TRUST BUILDING

of the building is shown in Fig. 8 and details of wind bracing connections for the spandrels in this elevation are shown in Fig. 5.

Banking Room Floor—The second floor or main banking room floor is of reinforced concrete of rather unusual construction. Fig. 3 indicates the outline of this construction to a small scale, while in Fig. 9 is given a larger scale half cross-section with the arrangement of reinforcing steel. The span center to center of supporting girders is 47½ ft. and there are no beams spanning between these girders, only a solid slab which

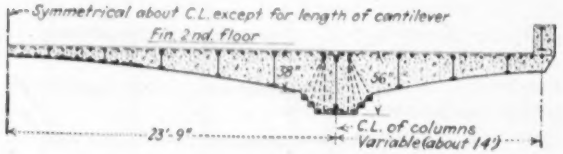


FIG. 9—SPECIAL CONCRETE SLAB FLOOR FOR BANKING ROOM
Note that the span is 47½ ft.

is 9 in. thick at the center. This construction extends for the length of the banking room, or about 150 ft.

A total of 26,000 yd. of concrete was used for the job. An average of 5¼ bags of cement was used for 2,000 lb. of concrete and 6½ bags for 3,000 lb. of concrete. The following table gives a summary of the results from the test cylinders:

Total No. Cyl. Taken	Spec. Strength at 28 Days, Lb.	Average of 7-Day Test, Lb.	Average of 28-Day Test, Lb.
600	2,000	1,573	2,609
18	2,500	1,435	2,760
210	3,000	2,454	4,010

828 total number of cylinders taken

Smith, Hinchman & Grylls, Detroit, are the architects and engineers for the Union Trust Building, with Donaldson & Meier as consulting architects. The foundations were put in by the Foundation Company, with Mr. Bean as architects' superintendent. The W. E. Wood Company, of Detroit, is the general contractor, with Mr. Sedille as architects' superintendent. The structural steel work was erected by the Bass Construction Company.

Brush Filters in Cape Town Sewage-Works

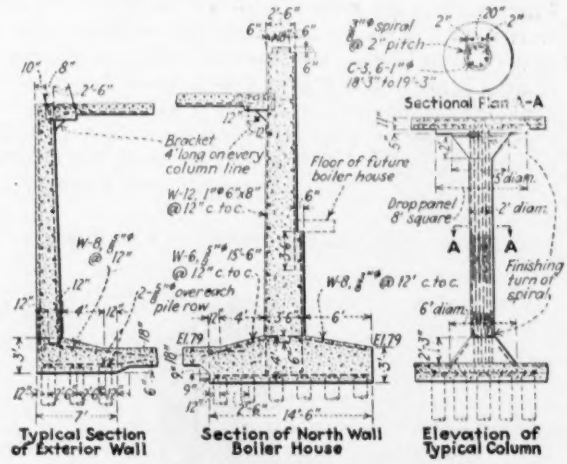
Brushwood instead of broken stone is used for bacteria beds or filters at the Athlone sewage-works of the southern district of Cape Town, South Africa. Pretreatment is given two-story settling tanks, the sludge from which goes to digestion tanks. The filter effluent passes to humus tanks, and the secondary tank effluent is treated by broad irrigation. The primary tanks have been used eight years with satisfactory results, according to a paper by D. E. Lloyd-Davies, city engineer of Cape Town, printed in the London *Surveyor* for May 24, 1929, read in April, 1929, before the Cape Province Municipal Association. The sewage is pumped. The brushwood beds have an area of nearly one acre and cost about £13,000, or about $63,000. Stone beds would have cost £15,000 per acre, but to treat the dry-weather flow of 3.3 Imp. m.g.d. 3½ acres of stone beds, Mr. Lloyd-Davies estimates, would have been required at a cost of £50,000, or $243,500. An experimental activated-sludge plant, on a fairly large scale, is about to be erected to compare with the brushwood beds as to cost and efficiency.

New 20-M.G. Clear-Water Reservoir for Detroit Water-Works

Filter Capacity Increased by Adding 60 Per Cent to Storage—Reinforced Concrete Used Throughout

By Eugene A. Hardin
Designing Engineer, Department of Water Supply, Detroit, Mich.

Completion of the necessary connections made it possible last year to put into use an additional clear-water reservoir at the Water Works Park plant of the Detroit Department of Water Supply. Studies, made in 1925, of the economical ratio of filtered water storage to filter capacity for Detroit conditions indicated that the capacity of the plant could be materially increased by adding 20 m.g. to the existing 35 m.g. of storage. (See "The Economical Capacity of Filters and Filtered Water Storage," by Arthur B. Morrill, *Journal* A.W.W.A., Vol. 16, p. 582.) About two-thirds of the total capacity of 55 m.g. is for equalizing the rate of demand on the filters and the remainder is


Sectional Plan A-A
Bracket 4' long on every column line
Floor of future boiler house
Drop panel 8' square
Finishing turn of spiral
over each pile row
Typical Section of Exterior Wall
Section of North Wall Boiler House
Elevation of Typical Column

WALL AND COLUMN DETAILS DETROIT CLEAR-WATER RESERVOIR

for reserve in case of a temporary shutdown of the filtered supply.

The new reservoir is about 300x476 ft. in plan and has a water depth of about 20 ft. when full. The irregular shape of the structure was caused by the desire to use all the space available and still avoid existing structures and provide for proposed future structures. All inlet and outlet openings in the reservoir are submerged in sumps so that they may develop their full cross-sectional area when the water level is at the floor line. The entire structure is of reinforced concrete of usual design, including a flat-slab roof. The latter is protected by 20 in. of earth on a 6-in. drainage layer of open stone.

The roof was designed for a total superimposed load of 500 lb. per sq.ft., which is ample to support 10-ton trucks in addition to the earth fill and usual live loads. This provision for accidental truck loads was made because the top of the reservoir cover is about the same level as the roadways alongside and it was feared that occasionally a loaded truck might be driven onto the

roof. It was also undesirable to fence the area. The strength of the roof made it safe to use trucks on it during construction and backfilling, which proved to be very convenient. It is felt that the cost of the extra thickness of slab and additional steel was justified.

The roof slab is a typical two-way flat-slab design supported on 24-in. round columns, spaced 20 ft. c. to c. The roof is sloped 2 ft. in the 300-ft. width for drainage. The side walls were designed as vertical slabs supported at top and bottom, with bottom completely fixed to insure watertightness. The bottom of the reservoir slopes 1 ft. from the edge of the wall footings to a shallow valley which runs diagonally across the floor. This valley was very useful in cleaning the reservoir after completion and was of small added expense. The bottom slab was designed as a flat slab to carry a possible water uplift of 325 lb. per sq.ft.

The reservoir rests on timber piles averaging about 30 ft. in length. The subgrade is drained by open-joint vitrified tile, with a 12-in. and an 8-in. main drain and 4-in. laterals spaced 10 ft. c. to c. and laid with open joints. The main drains lead into two small pump chambers in which float-controlled sump pumps keep the groundwater level down to a few feet above the floor line to prevent the possibility of flotation when the reservoir is emptied. Galvanized-iron pipes 2 in. in diameter connect with the underdrains inside of nine of the column shafts and extend to the ground surface above the reservoir roof. These were installed for the purpose of measuring the groundwater pressure level at various points under the floor at any time. They also serve as vents for the underdrain system. The entire outer perimeter of the reservoir is encircled by a perforated 12-in. cast-iron pipe belt drain for the purpose of intercepting water coming from the surrounding area or from any wall leaks and also to prevent the development of excessive uplift pressure on the reservoir bottom.

Excavation and piledriving were carried on during winter weather in preparation for concreting early in the following spring. Careful supervision of all construction work was maintained. Bearing tests of a number of the piles were made as the driving proceeded as a check on the computed bearing value of these piles. Bearing piles in the soft blue clay of this area, computed by the *Engineering News* formula to be able to support a load of 15 tons, showed a factor of safety of about two when tested a week after driving. The banks about the reservoir excavation were heavily surcharged by surrounding structures and considerable difficulty was encountered in supporting these banks when they thawed after a winter season of excavation and piledriving. Revetment walls both of round piling and of sheet piling sufficed to hold the banks until the concrete walls could be poured.

The first concrete was mixed with a portable ½-cu.yd. mixer, but the bulk of the concrete was mixed in a 1-yd. central mixer equipped with aggregate bins, measuring hoppers, inundator and water control. Modern methods of mixing and handling concrete were used throughout. Careful water control was maintained at all times and the uniform results are attributed to that fact. Care was used to obtain a watertight job throughout. All construction joints were provided with ample keyways and all vertical joints were provided with copper water stops. Leakage tests made after completion showed less than 100 gal. per minute leakage for the entire structure when full of water.

Plans and specifications were prepared and construction work was supervised by the engineering division of the Detroit Department of Water Supply under the direction of George H. Fenkell, general manager and chief engineer. Most of the work was done by the Whitney Brothers Company, of Duluth, Minn., under a general contract, completed in the fall of 1927. The total cost was $785,113, including engineering and the force account work incidental to the replacement of small piping and conduits disturbed by the work.

Difficult Tunnel and Bridge Work on French Mountain Railway

Large Amounts of Water Encountered Rendered Extensive Drainage Work Necessary—Viaducts Numerous

HEAVY and difficult construction work was involved on a 40-mile railway opened in October, 1928, by the Paris, Lyon & Mediterranean Railway, France, to connect with the Italian State Railways and complete a short route between Marseilles and Turin and northeastern Europe. Thus, from Bern, Switzerland, to Marseilles the rail route is now 367 miles instead of 560 miles. This new road, leaving the Mediterranean coastline railway at Nice and joining the Italian line at San Dalmazzo, near the frontier, crosses wild mountain country. It has numerous bridges, viaducts and tunnels, as well as long and heavy retaining walls along both cuts and sidehill fills to prevent slides on the steep mountain slopes.

FIG. 1—THE SCARASSONI BRIDGE
Stone arch of 158-ft. span, 105 ft. rise.

From Nice, a little above sea level, the line ascends by grades of 1.1 to 2.2 per cent for about 15 miles to an elevation of 1,368 ft. in the Col de Braus tunnel, which is 3¾ miles long. In the tunnel, the grade is 0.2 per cent to the summit and then descends at 0.9 per cent. Another tunnel, under Mont Grazian, is 2½ miles long, and then the line rises again at about 2 or 2½ per cent to Bergh, near the frontier, where there is a spiral tunnel 6,150 ft. long, followed by two similar but shorter tunnels on the Italian side, where connection is made with the Italian line at an elevation of 1,968 ft. All the tunnels, of which there are about 40, are built for double track, although the railway has only a single track at present.

In the tunnel work, serious troubles were caused by the presence of calcium sulphate in the rock. This ab-

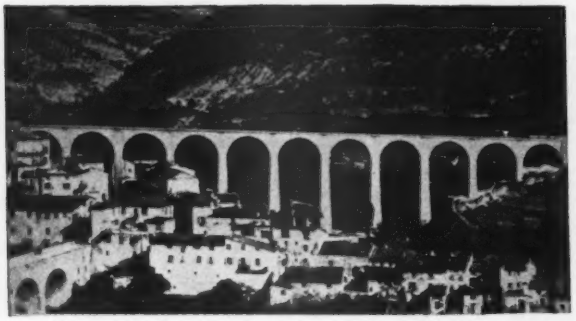


FIG. 2—THE ESCARENE VIADUCT

sorbed moisture on exposure to the air and formed gypsum, the material swelling in the process to such an extent as to require very heavy masonry lining to resist the pressure. Furthermore, in contact with water, the gypsum would dissolve and decompose ordinary mortar in the masonry, while by dissolving it would gradually form large cavities around the tunnel. For these same reasons the foundations were carried into dry gypsum and an alumina cement or "ciment fondu" was used which would not be affected by the gypsum.

To prevent the swelling of ground by absorption of moisture, extensive drainage works were carried out, including ditches and siphons, while in one tunnel tar was injected to fill or coat the voids behind the lining. In some of the tunnels large amounts of water were encountered. At the Tuhet tunnel a slide closed the bottom heading and necessitated a relocation, throwing the line further back into the mountain.

Arch bridges and viaducts are numerous and are of types common on the railways of continental Europe. Typical examples are the Scarassoni bridge (Fig. 1) and the Escarene viaduct (Fig. 2). The bridge, on a curve of 5½ deg., has an elliptical main arch of 158-ft. span with a rise of 105 ft., while the rail level is 138 ft. above the Roya River. The viaduct has eleven 50-ft. arch spans and its maximum height is about 135 ft. There are also long hillside viaducts where it was not desirable to disturb the slopes by making sidehill cuts or where it was necessary to make allowance for surface slides.

A bridge of unique design is that for the skew crossing of the narrow and precipitous gorge of the Bevera River (Fig. 3). Here a single span would have involved excessive cost and great difficulty in erection, but a middle pier would have blocked the narrow channel of the river. To provide a middle support without such obstruction, the novel plan was adopted of building a masonry arch at right angles to the bridge, spanning the stream and having upon its crown a platform or pedestal to serve as the bridge seat. This arch, of ogival form, has a clear span of 82 ft. and a clear height of 64 ft. above the water. The bridge seat and rail level are 72 ft. and 93 ft., respectively, above the water. Two deck lattice-truss spans of 150 ft. each form the railway bridge.

These difficult works have been carried out under the direction of Mr. Sejourne, assistant manager, and Mr. Martinet, chief engineer, of the Paris, Lyon & Mediterranean Railway.

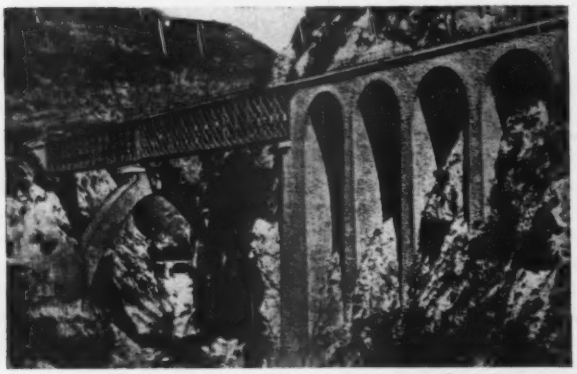


FIG. 3—BRIDGE OVER THE BEVERA RIVER
Stone arch across the stream supports two 150-ft. steel spans.

Sewer Charges Authorized in New York State

CHARGES for the use of municipal sewerage systems in New York State are authorized by Chaps. 225 and 678 of the Laws of New York, 1929, the first being an amendment (addition) to the village law and the second to the general city law of the state. The two authorizations are identical except that villages can make the charge only when their sewerage system includes "some form of sewage treatment plant" and that the system of charges is established by resolution of village trustees and by ordinance of common councils of cities.

The substance of each amendment is:

To establish by ordinance a scale of rents to be called "sewer rents" and to prescribe the manner in which and the time at which such rents are to be paid and to change such scale from time to time as may be deemed advisable. Such rents may be based upon either the metered consumption of water on premises connected with the sewer system, making due allowances for commercial use of water, the number and kind of plumbing fixtures connected with the sewer system or the number of persons served by said sewer system, or may be determined by the common council or other local legislative body of the city [board of trustees of the village] upon any other equitable basis. Such rents shall constitute a lien upon the real property served by sewers, and such a lien is prior and superior to every other lien or claim, except the lien of an existing tax, water rent or local assessment, and the common council or such local legislative body [or village trustees] may bring and maintain an action in the name of the city for the foreclosure of such liens for such sewer rents. The funds received from the collection of sewer rentals shall be kept as a separate and distinct fund and shall be known as the sewer fund. This fund shall be used for the payment of the cost of the management, maintenance, operation and repair of the sewerage system, including treatment and disposal works, and any surplus in such fund may be used for the enlargement or replacement of the same and for the payment of the interest on any debt incurred for the construction of such sewerage system, including sewage pumping, treatment and disposal works, and for retiring such debt, but shall not be used for the extension of a sewerage system to serve unsewered areas or for any purpose other than one or more of those above specified.

Engineers in Public Life

Morris R. Sherrerd, consulting engineer of the Department of Public Affairs of Newark, N. J., addressing the graduating class of Rensselaer Polytechnic Institute at Troy, N. Y., on June 15, said that they were entering the engineering profession at an auspicious time, when the engineer is being recognized as an administrator and executive, and when he not only "has been chosen to fill the highest office within the gift of the people but to fill many other executive positions." He said that the list embraces, in addition to President Hoover, five Governors —Larson of New Jersey, Buck of Delaware, Dern of Utah, Emerson of Wyoming and Parks of Alaska—four other Governors with engineering training, five United States Senators and 21 Representatives in Congress.

Site of the Power House and Factory. Picture Taken in December, 1926, When Work Had Just Begun

High-Head Power Plant of 120,000-Hp. Capacity Nearing Completion in Scotland

Lochaber Hydro-Electric Scheme Will Produce Power for Manufacture of Aluminum—Pressure Tunnel of 15 Ft. Diameter Is 15 Miles Long—Static Head Will Be 798 Ft.

THE Western Highlands of Scotland afford the most appropriate field in the British Isles for the development of water power. Visited by an average rainfall of from 60 to 160 in. a year, this country is also rich in natural reservoirs located at an altitude of 800 to 1,000 ft. above the sea. Seasonal variation in runoff is, however, very considerable because of the steep, shallow and rocky streambeds, and the question of storage takes an important place. Furthermore, for a development of considerable size it becomes necessary to carry the conduits an appreciable distance back from the power house site in order that the capacity be augmented by the many small tributary streams which will feed the conduit direct. These facts have a special bearing on the development described in this article.

For the past 32 years the British Aluminium Company has been the foremost in utilizing Scottish water powers and is responsible for three developments of great engineering interest and industrial importance. They are given in the accompanying table.

Development	Location	Horse-Power	Static Head	Date Installed
Foyers	Inverness	8,000	350	1896
Kinlochleven	Argyll	37,00	935	1909
Lochaber	Inverness	120,000	798	Under-construction

Because these power sources are permanently coupled to electrochemical factories operating at full load 365 days a year, special conditions have had to be met. The use of direct-current generators restricts the operating speed of the units within narrow limits, while continuity of supply (the load factor approaching 100 per cent) dictates low friction losses and temperature rise in the machines in addition to high efficiency in the hydraulic section of the work.

For the Lochaber development the power house of 120,000 hp. and the contiguous factory are being built about a mile northeast of Fort William, in Inverness-shire. This town is situated on Loch Linnhe and is accessible to oceangoing steamers. A reinforced-concrete pier connected with the factory by electric railway has been built in connection with this work. The actual headworks lie back in the hills 16 miles east of Fort William.

Reservoirs—Water is derived from a drainage area of 303 square miles as shown in the accompanying map, the annual rainfall over this area varying from 160 in. at the western end near Ben Nevis down to 60 in. at the eastern end 33 miles distant. A runoff of 1,600 sec.-ft. is dealt with in the Lochaber project. Loch Laggan and Loch Treig form the main reservoirs, having a capacity of 9,240 million cubic feet.

The development will consists of three sections: (*a*) a dam on the River Spey 30 ft. high and 900 ft. long just above Laggan Bridge. It will form a reservoir 2 miles in length to regulate and divert the floodwaters across the watershed to the River Pattach, thence into the Loch

DIVERSION DAM ON A TRIBUTARY STREAM
Water is diverted down a shaft to the main pressure tunnel.

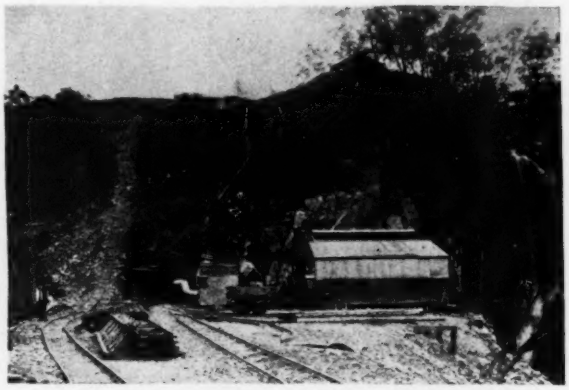
Laggan reservoir. This flow will be reinforced by tapping the River Mashie. (*b*) A dam 45 ft. high and 550 ft. long on the River Spean 4 miles below Loch Laggan, extending the latter to a length of 10 miles. It will be so designed as to permit a drawdown of 16 ft. on the present level of the lake. (*c*) A dam 40 ft. high and 440 ft. long at the outlet of Loch Treig, raising its level by 40 ft.

The main tunnel feeding the power plant taps Loch Treig 100 ft. below the present surface. There will, therefore, be a possible drawdown of 140 ft. after the dams are built. For the ultimate development a 4-mile pressure tunnel will be built connecting Loch Treig with Loch Laggan and simultaneously tapping intersecting streams.

Pressure Tunnel—The most significant part of the entire work is the pressure tunnel connecting the Loch Treig reservoir with the power house penstocks 15 miles away. The only water tunnels longer than this are the Shandaken aqueduct in the Catskill Mountains of New York and the Hetch Hetchy aqueduct in the Sierras of California, both being somewhat over 18 miles in length. On a basis of yardage excavated, they are surpassed by the Lochaber tunnel by reason of its greater size, which is equivalent to a 15-ft. circle having an area inside lining of 181 sq.ft.

As already indicated, the tunnel line intersects a number of streams which do not flow into the main reservoir system. Arrangements have, therefore, been made to tap these streams by means of eleven vertical shafts, and to feed the tunnel therefrom. In this way the total runoff is considerably augmented in flood time and part of the water thus collected, by reason of its greater head, flows back up the tunnel into Loch Treig, reinforcing the reservoir storage.

This differential feature as applied to a pressure tunnel of any size is believed to be quite novel, and obviously new problems have had to be solved. Special care has been exercised in the design of the intake shafts to avoid the trapping of air, which, since the tunnel is always under pressure, would lead to serious water hammer. A further provision has had to be made by which the intake shafts can be closed to prevent dewatering the streams during the fish-spawning season.

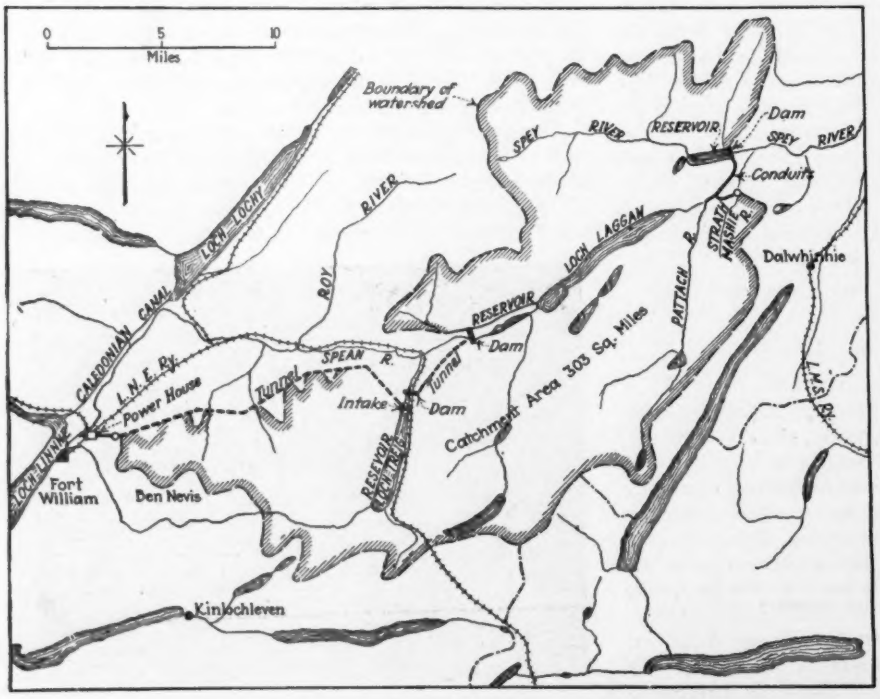


ONE OF THE FOURTEEN ADITS OF THE TUNNEL

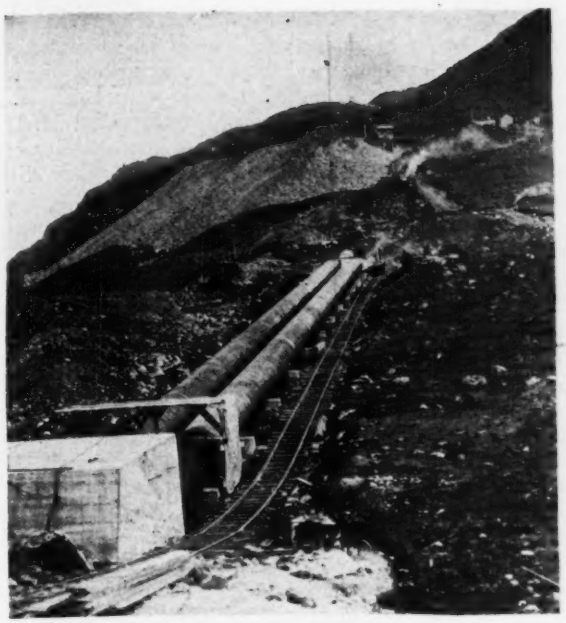
The hydraulic characteristics of the present tunnel design have been analyzed by Reginald S. Cole in a paper, "The Surge Chamber in Hydro-Electric Installations" (Institution of Civil Engineers, paper No. 55, 1927.) In this paper calculations are made for any water tunnel with a varying and irregular hydraulic grade and general expressions are derived for computing a tunnel of any size with any number of intermediate intake shafts. The effect of the shafts in modifying surges has also been studied by means of a scale model, the result being to confirm the mathematical analysis. Original features are embodied not only in the design but in the construction of the tunnel.

Hard granite and granidiorite are encountered in excavation with seams of schist and a small percentage of decomposed granite. With the exception of this latter, the ground is sound and relatively free from water. The work is proceeding by a modified heading and bench method at 23 headings, the odd number being due to the fact that the north portal will be more than a hundred feet below the surface of Loch Treig and is therefore inaccessible. It will be approached from within and the last shot will carry the bore right into the lake.

For the greater part of the work liquid oxygen cartridges are used instead of dynamite, gelignite being employed for the remainder. This is believed to be the only work of its kind where liquid oxygen has been used on so large a scale.



MAP SHOWING LOCATION OF TUNNELS AND POWER HOUSE



ONE OF THE PENSTOCK LINES

Storage battery locomotives handle the spoil from the headings in the customary way, most of the approaches being by horizontal adits. There are fourteen such adits varying from 420 to 1,440 ft. in length. Eight construction shafts have also been sunk having depths of from 200 to 356 ft.

As already indicated, the design of the work differs from that of a power supply system in being designed for a 100 per cent load factor. The tunnel, penstocks and conduits therefore will carry the full load flow continuously day and night. Consequently friction and other losses dependent on velocity assume a new importance, and special attention has been directed to the design of a conduit system with a minimum friction coefficient. The tunnel is not only being lined throughout but special means have been used to secure a permanently smooth concrete surface.

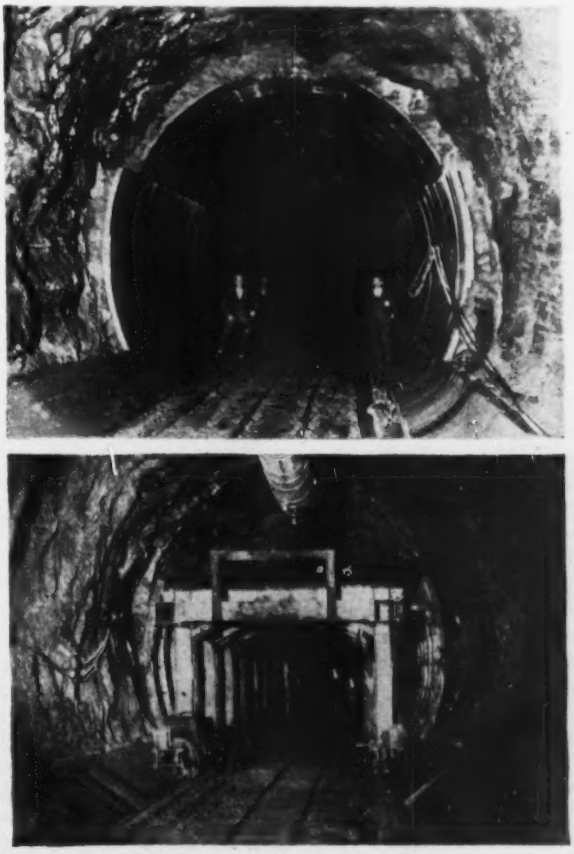
Penstocks and Power House—At the lower end of the tunnel a surge tank 220 ft. deep is excavated in the rock and at this point the tunnel divides into two branches, each of which feeds three steel penstocks 66 in. in diameter. Automatic valves of the butterfly type control the flow in the penstocks, the latter being 3,200 ft. in length and falling nearly 600 ft. to the power station. The actual net static head between the surface of Loch Treig and the wheel nozzles is 798 ft. Gravity anchorages are installed for each pipe 600 ft. apart on the grade and an expansion joint is introduced below each anchor. At the foot of the incline each of the six pipes again bifurcates into two, each branch serving a waterwheel of the impluse type of approximately 10,000 hp. Each of these wheels is coupled direct to two generators which feed the direct-current bus line for the aluminum factory. The total ultimate capacity of the development on a 100 per cent load factor basis is 120,000 hp.

In order to take full advantage of the head available and to reduce the length of the penstocks, the power house is sunk 40 ft. below grade, the turbine pits and tailrace being still deeper. Access to the power house is obtained by means of an incline in rock cutting. The tailrace from the power house will discharge into the River Lochy and will have a length of 3,000 ft., of which 2,000 ft. is open cut and the remainder tunnel. Concrete lining is used throughout.

Construction Details—The excavation and lining of the 15-mile tunnel form the most important item of the work and absorb the greater part of the personnel employed. Workmen's camps are situated at each of the shafts and adits, there being accommodation for a force of 2,500 men, together with hospitals, recreation halls and canteens.

For the operation of compressors, electrical equipment and the like, a temporary hydro-electric power house has been built at a point near the center of the work. The falls of Monessie on the River Spean are diverted to produce 5,000 hp., which energy is transmitted by an 11,000-volt aluminum pole line to the various transformer stations distributed over the territory of the work. A private telephone system also connects all points of the job.

Parliamentary procedure is necessary in Britain before any natural resources in the country can be commercially developed. The Lochaber project was authorized by an act of Parliament in 1921 and the provisional order under which the work is being done was initiated by W. Murray Morrison, director and general manager of the British Aluminium Company, Ltd., and associated companies. The general design and layout of the scheme are due to the late C. S. Meik, who was succeeded by



LINING THE PRESSURE TUNNEL

Precast liners were used in part of the tunnel, but generally the lining was placed by methods similar to those used in this country.

W. T. Halcrow, of the firm of C. S. Meik & Halcrow, consulting engineers for the civil engineering works, with whom is associated W. J. E. Binnie. The designs of the power plant and factories are being carried out under the direction of W. Murray Morrison, J. S. Bliss, technical manager, and A. S. Kinnear, architect, of the British Aluminium Company, Ltd.

The principal contractors for the civil engineering works are Balfour Beatty & Company, Ltd.; for the pressure pipe line, the South Durham Steel & Iron Company, Ltd.; for the valves, Glenfield & Kennedy, Ltd.; and for the gates, Ransomes & Rapier, Ltd. The English Electric Company, Ltd., is supplying all the main turbines and generators, and Metropolitan-Vickers and Boving & Company are supplying the subsidiary turbines and generating plant.

Educators Discuss Engineering Problems at Ohio State

Speakers Treat of Various Phases of Technical Graduates' Work—Over 500 Members Attend Meeting

THE GRADUATE and his work was the general theme of the 37th annual convention of the Society for the Promotion of Engineering Education held June 19-22, 1929, at Ohio State University, Columbus, Ohio. More than 500 members, delegates and guests were in attendance, the largest registration reported since the founding of the society in 1893.

An event of particular importance in the meeting was the awarding of the Lamme medal, the gift of the late Benjamin G. Lamme, to Irving Porter Church, professor emeritus of mechanics and hydraulics at Cornell University, in recognition of outstanding contributions to engineering education, both as teacher and author. The selection of Dr. Church as the second recipient of the medal was announced at the annual dinner. In his absence, Prof. Paul M. Lincoln made the acceptance speech, recalling Mr. Lamme's interest in engineering education and the first award of the medal, in 1928, to Prof. George F. Swain, of Harvard.

The Graduate and His Work

At the opening session the visitors were welcomed by Dr. George W. Rightmire, president of Ohio State University, who paid tribute to the work of engineers in government, research and industry. Dexter S. Kimball, dean of the College of Engineering, Cornell University, and president of the society, responded and introduced the subject, "The Graduate and His Work." This general theme was a natural outgrowth of the recent investigation of the co-ordination between education and industry, a study of standards of quality and performance such as are demanded of the products of industry. R. I. Rees, assistant vice-president, American Telephone & Telegraph Company, and C. R. Dooley, manager of personnel and training, Standard Oil Company of New York, presented the side of industry and called particular attention to the present demand for technical graduates, so keen that companies send representatives to the colleges rather than wait for the graduates to make applications. Mr. Rees emphasized the value of engineering training, regardless of the specific course pursued. The representatives of engineering schools who indicated the demand for graduates and the large proportion of graduates who remain in technical work were Dean H. S. Evans, University of Colorado; Director Paul M. Lincoln, Cornell University; Dean Louis Mitchell, Syracuse University, and Prof. W. T. Magruder, Ohio State University.

Presidential and Other Addresses

The presidential address, "The Economic and Social Significance of Engineering," was presented by Dean Dexter S. Kimball, who ridiculed fears of theorists that the world is becoming mechanical and soulless because of the work of the engineer. He pointed out that the change from backbreaking toil to conveniences and luxuries for all was bound to be attended with some confusion, but that, on the whole, society is benefiting spiritually as well as physically by the ingenuity of the engineer.

Dean E. A. Hitchcock, Ohio State University, struck a sympathetic chord in his address, "Some Reflections on Engineering Education." His observations and meditations during 38 years of teaching and engineering practice have led him to the conclusion that educational theorists, continually erecting additional hurdles for the students, are unduly pessimistic about the character of the embryo engineers in their charge. The surest way of winning a proper response, he pointed out, was by personal care of the instructors that the students have an interest in the work. In Dean Hitchcock's opinion, more than 99 per cent of students will do their best if made to feel that the instructor has confidence in them.

Other addresses were made by Sam A. Lewisohn, vice-president, Miami Copper Company, who presented the need for proper instruction in labor relations; L. W. Wallace, secretary, American Engineering Council, who described the work of the council in making the services of the engineer available for public benefit, in achieving standardization and waste elimination and in making progress toward uniform traffic codes; Arthur E. Morgan, president, Antioch College, who outlined the plans for Mississippi River flood control; and Prof. William L. Evans, department of chemistry, Ohio State University, who told of the methods used in teaching chemistry to freshmen. In spite of the mass production involved when 1,800 are taking the course, an attempt is made to have personal contact with every student. Professor Evans mentioned particularly the benefits of a short quiz, given at the beginning of every laboratory period, graded during the period and explained at the end of the period, as a means of clearing up points while they are fresh in the students' minds.

Committee Reports and Conferences

Co-ordination of preparatory and engineering education, industrial aptitude of technical graduates, and personnel instruction were subjects of special committee reports. Student branches of the national engineering societies were considered in a special conference of engineering educators and representatives of the societies. W. E. Wickenden, newly elected president of the Case School of Applied Science, H. P. Hammond, professor of civil engineering at Brooklyn Polytechnic Institute, and R. H. Spahr, member of the S.P.E.E. staff, reported the activities of the board of investigation and co-ordination.

The conferences, which in a crowded program could

not be attended by all who were interested, were provocative of much valuable discussion. At the engineering drawing conference the committee on research, after an investigation of the situation in schools all over the country, recommended a minimum of twelve clock-hours per week on drawing during the freshman year. Sectioning of students according to experience and ability was adopted as a policy. A summer school for teachers of drawing was indicated as a possibility for 1930.

The English conference was marked by pleas for more time for English instruction (those present were by no means unanimous in the belief that more time was needed), by expressions that valuable training in English is and should be part of the instruction of other courses, by opinions that teachers of English would be more effective if they had had some work in engineering, and by students that it is unfortunate that the impression has got out that the English of the engineer is inferior to that of other professional men. At the industrial engineering conference the question as to whether industrial engineering should be a service or a degree-granting department was discussed with a slight preponderance of opinion in favor of the degrees. The relative values of the school shop and the outside shop were considered, the school shop winning overwhelmingly in the opinion of those present.

The engineer's need for ability in written and spoken English, not in oratory, was the theme of the paper by F. H. Sheets, director, Illinois Highway Department, presented at the civil engineering conference. John M. Fitzgerald, of the committee on public relations of the Eastern railroads, pleaded for fair treatment of the railroads instead of high valuations for taxation and low valuations for rate schedules. Philip Burgess, engineer, of Columbus, Ohio, pointed out that the engineering graduates need to know something about finance, even such simple things as how to get a loan at the bank. The conference on electrical engineering was devoted to the relation of the undergraduate curriculum in electrical engineering to work after graduation. Prof. H. H. Higbie, University of Michigan, pointed out the need for the co-operation of industry in training illuminating engineers; Prof. W. L. Everitt, Ohio State University, presented lecture-room demonstrations of phenomena in communication engineering, and Prof. R. W. Sorensen, California Institute of Technology, discussed incentives to scholarship and interest.

The high point in the social events was the annual dinner at which Gen. W. E. Gilmore, chief, material division, Wright Field, Dayton, Ohio, gave an address on aircraft development. At the smoker on the first evening of the meeting Phillips Thomas, engineer with the Westinghouse Electric & Manufacturing Company, lectured on byproducts of radio, describing and demonstrating control systems for traffic lights, airport illumination, an improved loud speaker and other interesting devices.

Results of Election

R. I. Rees, American Telephone & Telegraph Company, was elected president for 1929-30. New vice-presidents are Prof. Edward Bennett, University of Wisconsin, and Dean E. A. Hitchcock, Ohio State University. Prof. F. L. Bishop, University of Pittsburgh, was re-elected secretary, and W. O. Wiley, of John Wiley & Sons, treasurer. McGill University, Montreal, was chosen the meeting place for the 1930 convention.

The Association of Co-operative Colleges found time, in spite of the crowded program, for a meeting during the S.P.E.E. convention. A number of teachers of mechanics remained for the conference lasting until June 27 for a full and unhampered discussion of a number of fundamental and important questions regarding the teaching of engineering mechanics.

Some Features of Two Concrete Arch Bridges in Berks County, Pa.

Piers Skewed 42 Degrees on Hamburg Bridge—Water Concreting—Birdsboro Bridge Piers Supported on Slag Concrete Piles

By L. F. Christman
County Engineer, Berks County, Reading, Pa.

TWO REINFORCED concrete arch bridges completed on the same day in Berks County, Pa., contain several features of interest in their design and construction. Both structures replace old wooden bridges, span the Schuylkill River and utilize slag as coarse aggregate. The Hamburg bridge is notable for its unusual skew, piers being placed parallel to the stream flow with the roadway crossing at a 42 deg. angle. Another interesting feature of this structure is the use of square spandrel walls and cross-beams on a skew bridge. Also special precautions were used to guard the concrete from freezing during winter operations. The Birdsboro bridge is a considerably larger structure but of more usual design. It utilizes piling made from slag concrete and is somewhat special in that a ramp leads off the bridge at an approximate right angle to its center line.

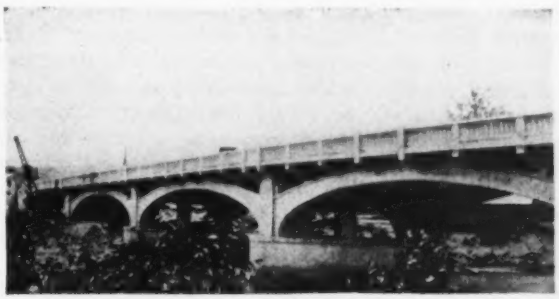


FIG. 1—BRIDGE WITH PRONOUNCED SKEW SPANNING SCHUYLKILL RIVER AT HAMBURG, PA.
Low rise of the arches and the comparatively short height of the piers above water materially aided the contractor in inclosing the complete structure during winter curing of the concrete.

The Hamburg Bridge—The bridge at Hamburg, Pa. (Fig. 1), consists of four 86-ft. arch spans with a rise of 12½ ft. and together with its approach walls attains a total length of 529 ft. Two arch ribs 5½ ft. wide are used. The deck consists of a 24-ft. roadway, with 7-ft. sidewalks, of which 5 ft. is cantilevered. The concrete totals 5,500 cu.yd.

The noteworthy feature of the design is the skew of the piers (Fig. 2), which are at an angle of 42 deg. from the center line of the bridge and parallel to the direction of stream flow. Piers are 10 ft. 1½ in. wide and the ribs, which are built square to the center line of the bridge, are supported on the piers on a block 9 ft. long and 5½ ft. wide.

The spandrel walls are 18 in. thick and spaced 12½ ft.

FIG. 2—HAMBURG BRIDGE UNDER CONSTRUCTION
Note extreme skew. All members of the bridge superstructure are, however, square with the center line of the roadway.

c. to c. They also are placed square to the center line of the bridge, and with this construction one end of one spandrel wall rests on the pier and the other end 25 ft. out on the companion rib, as shown in Fig. 3. The intermediate wall and beam of this companion rib, which is 12½ ft. from the pier, is hardly more than one-half the length of the other spandrel walls and beams; its inner end touches on the pier line near the center line of the bridge supported by a column resting on the hollow curtain walls between the solid ends of the piers. These curtain walls are designed as beams. This arrangement of spandrel walls causes unequal rise and fall of opposite ends with variations of temperature in the arch ribs. The consequent distortion of the roadway slab from this effect, however, was not considered sufficient to do harm.

There was some difficulty in planning location of construction joints in the arch ribs and roadway slab. The crown of the arch was monolithic with the slab, which required coincidental pouring of opposite crowns of ribs to assure equal settlement. Since one crown was two beams ahead of the other end (Fig. 3), to pour them full would require pouring haunches as well as crowns of arches without keys, which was neither desirable nor practicable. The solution was to cut transversely through the middle of the slab just beyond the crown on each side and run a longitudinal joint on the center line of the bridge, cutting two beams on each side. Then the adjacent crowns of the arches were poured at the same time, followed by pouring the haunches and as a final operation the pouring of the slab.

The simplicity of formwork, the saving in steel and concrete in beams by spanning ribs the shortest way, the use of square sidewalk cantilevers beyond the ribs and the assurance that every square inch of cross-section in the squarely set arch ribs is taking its share of the load were considered benefits which more than offset any disadvantages.

This bridge offered an excellent opportunity for direct heating of the floor slab and ribs for winter concreting. The 12½-ft. rise of the arch ribs and the low height of the piers, no more than 10 ft. above water, permitted the sides to be completely inclosed, tin from the roof of the old covered wooden bridge being nailed to the centering for the purpose. Walks at pier level on the wooden piling allowed advantageous placing of salamanders, a half-dozen large ones being used in each span. The top of the slab was covered with tarpaulins and heated by numerous lanterns. Thermometers were placed at doubtful places to keep a positive check on temperatures adjacent to the concrete and heating was continued for 72 hours after the end of the pour.

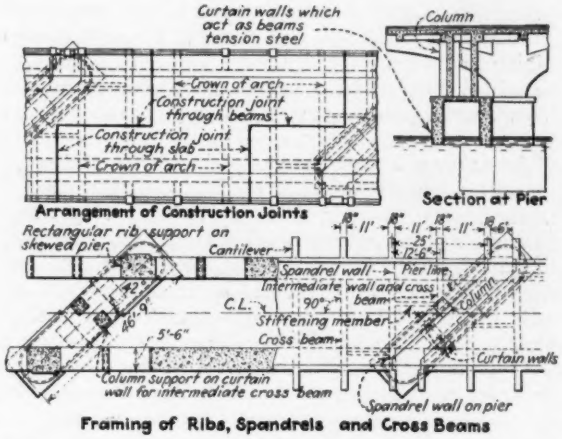


FIG. 3—UNUSUAL SKEW DETAILS OF HAMBURG BRIDGE

Birdsboro Bridge—The main part of the bridge at Birdsboro, Pa., consists of nine arch spans of 108 ft. each, set on a straight grade of 2.13 per cent with no abutment piers at any intermediate point. The bridge is of open spandrel arch construction with two ribs of 7½ ft. width and 22 ft. rise. The roadway is 24 ft., which with the sidewalks centilevered 5 ft. gives a total width of 39 ft. The total length of the bridge is 1,123 ft. Concrete totaled 10,350 cu.yd.

A feature of the bridge is a ramp leading down at a

FIG. 4—RIGHT-ANGLE RAMP ON BRIDGE AT BIRDSBORO, PA.

right angle near the center of the structure. This ramp, 396 ft. long with an 18-ft. roadway, consists of ten reinforced concrete girder spans of 36 ft. each, set on rather high slender columns which are X-braced to stiffen them against a downgrade thrust caused by a 7½ per cent grade.

Another feature of the structures is the use of 88 slag concrete piles 20 ft. long. The piles are octagonal in form and are 16 in. in diameter untapered except 18 in. from the head. They are reinforced with 6⅞ in. diameter round bars lengthwise and ¼ in. spirals at about 9 in. spacing. Concrete proportioned 1:3:5 was used. The piles were kept wet and allowed to set three weeks before driving. They were driven with a heavy double-acting steam hammer operating at 140 strokes per minute to a resistance requiring 100 strokes to sink the pile one inch. Piles stopped in a stratum of gravel at a

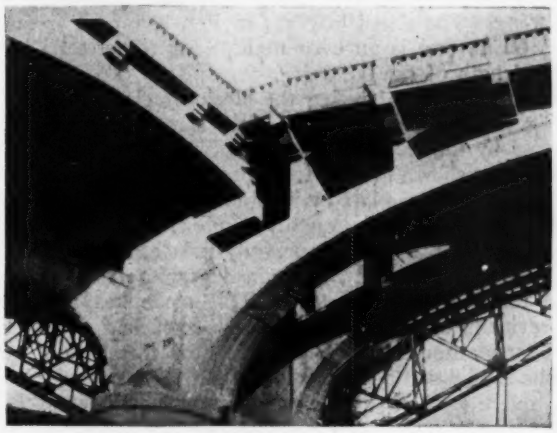


FIG. 5—CONCRETE DETAILS AT POINT WHERE RAMP LEAVES MAIN STRUCTURE

depth of about 10 ft. and none of the piles was seen to crack at any place nor did the heads of the piles spall off at any time.

Both bridges were designed by Charles F. Sanders, county engineer of Berks County, and the construction was supervised by him until a breakdown in his health in July, 1927. Supervision was completed by the writer, who succeeded him as county engineer. Both structures were built by the Whittaker & Diehl Company, Harrisburg, Pa., J. E. Minnich, engineer, and M. C. Wolfe and R. N. Bierly, superintendents. The total cost of the Hamburg bridge was $134,900, while the Birdsboro bridge cost $348,864.

Heavy Railway Gun to Cross U. S.

Transportation of one of the U. S. Army's largest railway-mounted coast defense guns across the continent will take place in the near future, according to a statement issued by the Department of War. The 14-in. gun with mount weighs 730,000 lb. It will be moved from the Aberdeen Proving Grounds in Maryland to the Presidio at San Francisco, Calif. The great weight of the gun demands extreme care in its transportation. Advantage will be taken of this opportunity to determine its performance on a long journey over a variety of trackage, the manner in which the railroads will handle such a shipment and whether transportation can be made without delay on account of the condition of tracks, tunnels, bridges, grades and curves.

Pittsburgh to Develop Airport Under Difficult Conditions

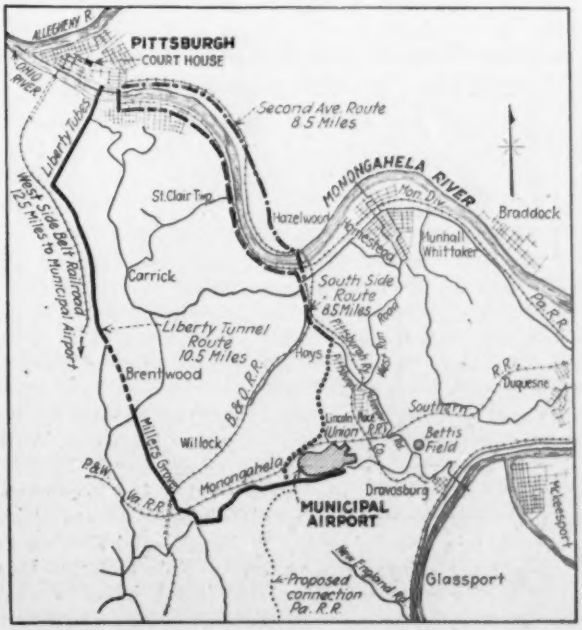
Mountainous Terrain Necessitates Site Nearly 10 Miles From City Hall—Heavy Excavation Required

By G. Brooks Ross
Engineer in Charge, Allegheny County Department of Public Works

DUE to the handicaps to flying imposed by nature on the vicinity of Pittsburgh, Pa., it was necessary to consider a number of locations in determining the site for a large-scale municipal airport. After studying 186 suggestions, the final location was selected on the Lebanon Church Road in Mifflin township, Allegheny County. Facilities for access to this site are good from various parts of the county. It is adjacent to the Monongahela Southern Railroad, which, through the Union Railroad, connects with all main-line railroad systems in the Pittsburgh district. The site is also reached by the West Side Belt Railroad at a distance of 12.5 miles from the center of the business district of Pittsburgh, and by highway through the South Side (8.5 miles) or by the Liberty tubes and the Saw Mill Run Boulevard (10.5 miles). Motoring time to the post office by either of these routes is about sixteen minutes.

The selected site lies south of the parallel through Pittsburgh, thus avoiding the necessity of flying through congested territory from the east, south or west. On account of its elevation, the site is relatively free from fog and smoke. The suitability of the location has been indorsed by the local advisory committee of aviators, the U. S. Department of Commerce, the Chamber of Commerce, the Allegheny County Planning Commission, the Council of the city of Pittsburgh and the Board of Commissioners of Allegheny County.

Physical Features—Finished grade for the field has been established at 1,250 ft. above sea level. As a pre-



LOCATION MAP OF PITTSBURGH MUNICIPAL AIRPORT

liminary step, plans have been completed for grading and subgrading of an area of 190 acres, necessitating 2,815,000 cu.yd. of excavation with a maximum cut of 40 ft. and a maximum fill of 73 ft. The estimated cost for this work, for which bids were received July 2, is $1,515,200. It is expected that the preliminary field will be ready in about ten months' time.

Ultimately an area of 275 acres for landing and taking off exclusively will be provided for. This will necessitate 10,000,000 cu.yd. of slag fill with a maximum depth of 52 ft., which will be dumped at the rate of 1,500,000 cu.yd. per year from a railroad siding to be laid into the field. Gradual filling not only will be economical but also will provide additional landing area as activities on the field increase. The final layout of the landing and take-off area will be arranged for an all-way field with runways up to a mile in length. This will comply with Department of Commerce regulations for an A-1-A field. Besides the 275 acres for runways, space will be provided for the usual adjuncts to a first-class flying field, including a reviewing stand to accommodate 65,000 people, parking space for 20,000 automobiles, airplane manufacturing and display space, a hotel, a hospital, an administration building and facilities for telegraph and radio communication, mail, express and newspaper rooms, etc.

Condemnation—Provision has been made for the condemnation of 44 separate properties with a total area of approximately 755 acres. This will later be increased to 1,100 acres to provide for future development. Financing to date consists of a bond issue of $1,500,000 approved by the people of Allegheny County in June, 1928, and an appropriation of $500,000 by the city of Pittsburgh. The airport has been designed and will be constructed by the Allegheny County Department of Public Works, Norman F. Brown, director, W. H. R. Kreiling, assistant director, and the author as engineer in charge.

Durax Pavement for Steep Grades in Tokyo, Japan

Its Durability, Surface Roughness and Moderate Cost Have Made It Standard for Grades of Over 4 Per Cent

By Yasuhei Emori

Paving Engineer, Department of Public Works, Tokyo, Japan

THE hilly portions of Tokyo lying back from the bay have many steep streets, and while motor traffic is increasing the horse-drawn vehicle has to be given careful consideration in selecting pavement. After trial of various types of construction, durax block pavement has come to be most widely used. Indeed its durability, surface roughness and moderate cost have made it virtually standard construction for streets having grades exceeding 4 per cent. Some 36,146 sq.yd. in 21 parcels have recently been constructed.

As shown by Fig. 1 the base is 6 in. of 1:3:6 concrete on a carefully prepared subgrade. The blocks are 3½-in. cubes laid in arcs as shown by Figs. 1 and 2, with as closely fitted joints as is possible. This arching gives an attractive appearance, and eliminates joints parallel to the traffic. The curve of the arch is also usually set up-grade so as to give the pavement arch action against

FIG. 1—DURAX PAVEMENT UNDER CONSTRUCTION

sliding. The chord length, *l* in Fig. 2, ranges from 40 to 60 in. and is an even multiple of the street width; the length of arc is 90 deg.

The method of laying the blocks is clearly shown in Fig. 2 and the character of the surface obtained is indicated by the view of a section of pavement under construction shown in Fig. 1.

The blocks are laid by hand on a 1-in. cushion of 1:3 mortar and are thoroughly tamped. The joints are filled with 1:2 mortar carefully pressed in. Generally the blocks used are fine-grained granite from quarries in the Ibaragi Prefecture. This stone has a specific gravity in excess of 2½, a French coefficient of over 15 and an absorption per cubic foot of less than 1.6 lb. The blocks cost about 1½c. each and 94 are required for a square yard of pavement. A recent pavement, including foundation, cost $4 a square yard.

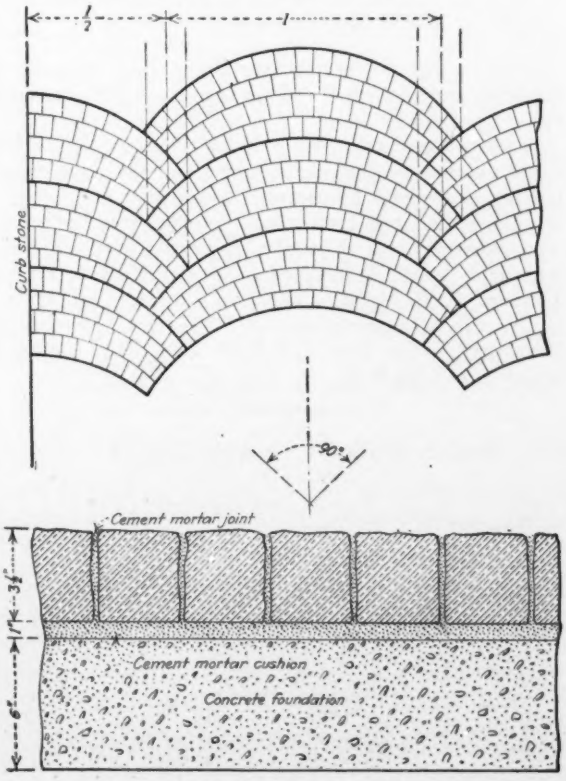


FIG. 2—STRUCTURAL DETAILS OF DURAX PAVEMENT IN TOKYO

Discussion of Materials Develops Many New Facts at A.S.T.M. Meeting

Atlantic City Gathering Attracts Testing and Materials Men of Many Industries—Large Program of Papers and Much Investigative Work—Routine Standardization Activities Maintain Their Volume

Engineering News-Record Staff Report

STEADILY increasing activity in the field of engineering materials and testing methods was reflected in the proceedings at the meeting of the American Society for Testing Materials last week. A new high record of attendance was established, nearly 1,000 members being present. Development and revision of standard specifications for materials proved to be even more active than in prior years, partly because a number of new materials are receiving attention and the requirements of industrial production and purchase call for increasing refinement in classification and test specification. At the same time a great growth of investigative work was evident, dealing with the service value as well as with test properties of materials. This work was reflected in a large program of interesting papers, ranging from metals, cement and brick to rubber and textiles.

As usual, the meeting was held at Atlantic City. But in view of the increased interest of Western members during the past year it is possible that next year's meeting will be held away from the Atlantic coast. Chicago is under discussion.

Change in Standardization Procedure

Of the internal affairs of the society an important change in standardizing procedure should be noted. The executive committee has established a committee on standards, to have general correlating and initiative supervision over the technical standardization work. By a change in the bylaws, this new body will also be given power to accept a proposed new specification or test method as a *tentative standard* upon receiving a report and recommendation to that effect from one of the technical committees. Heretofore the adoption of tentative standards has required the vote of the society members at the annual meeting. Vote of the society will still be required for the advancement of a tentative standard to a standard.

Standardization and Good Will

"Standardization and Good Will" was the subject of the address of the retiring president, Dr. G. W. Thompson (National Lead Company, New York). After analyzing the functions of standard specifications and emphasizing their value in the case of engineering materials used in quantity for specific purposes, he inquired whether a producer who builds up an asset of good will through the excellence of his product will lose by the establishment of a standard specification for that product. His answer was that the competent and conscientious producer can gain far greater good will through his tested performance when purchases are made under a recognized standard than is possible when there is no standard or test and when price alone governs.

Dudley Medal Awards—The Dudley Medal for the best paper of the past year was awarded to J. J. Kanter and L. W. Spring (Crane Company, Chicago), for a paper "Long-Time or Flow Tests of Carbon Steels at Various Temperatures."

Dushman Delivers Marburg Lecture—The fourth Edgar Marburg lecture was delivered by Dr. Saul Dushman, assistant director of the research laboratory of the General Electric Company, Schenectady. His theme was "The Nature of Cohesive Forces in Solids." The lecturer outlined the views of present-day physics on the orbital arrangement of particles to form atoms, the relation of the revolving particles of adjacent atoms, and how this relation establishes the cohesion of the material. Calculations of tensile strength on this basis have led to some approximate experimental checks, but elsewhere large discrepancies remain, it appears.

New Cement Specification Formulated

The principal developments at the meeting in the field of civil engineering materials related to fatigue, corrosion, cement and aggregates—sand, gravel, broken stone, slag and the like. Brick, wood, steel and road materials also received attention. In less direct way many of the new points in test knowledge or testing methods that were brought out touch the civil engineer's interests.

No single action at the meeting is of more general concern to the field than the discussions of the cement committee about the cement specification. Their outcome was that a new specification for portland cement was framed, radically different from the present standard. While the importance of this move and the magnitude of the interests affected make the proposed change a matter of countrywide concern, its essential facts were not laid before the sessions of the society but were kept within the committee circle. Nevertheless it is planned to put the new specification into effect soon as a "tentative" specification. This is to be accomplished through the new committee on standards, which will eliminate the need for a vote on the subject at a meeting of the society.

Cement specifications have been in the limelight during the past year or two because several state highway departments have called for higher strength and in some cases for earlier test periods, and because various high-early-strength portland cements have been in the market and have attained an important position in spite of the absence of a recognized uniform specification applicable to them. Recent reports of the society's cement committee made little or no mention of these new cements and apparently the committee rather ignored them. But the need of classifying them or grouping them in a single class marked off from normal portland became steadily more apparent.

Two months ago, finally, the committee adopted a definition of "high-early-strength hydraulic cement" characterizing such cement by a 48-hour strength equal to the 28-day strength specified for standard portland.

Last week, however, the committee tacitly abandoned this definition and instead, after much confused talk back and forth, drafted a revision of the existing standard cement specification which takes cognizance both of high-early strength cement and of higher standards for regular cement.

As already indicated, the committee did not report this action to the society in detail, presumably on the ground that it had not been announced in the official program. It merely reported that a revised portland cement specification had been drawn up which fixes earlier test periods and higher tensile strengths and recognizes another class of cement with still earlier test periods and higher strengths. As might be expected, there was no discussion of this report by the society. The new draft is now to be submitted to the entire committee for letter ballot, and if so approved will then be referred to the society's newly created committee on standards; if approved by the committee on standards, the specification will become a tentative standard by next January, according to present plans.

The text of the new specification being not available—the practice of the A. S. T. M. is to withhold committee proceedings from public knowledge except as reported at society meetings—an outline can be given only on information and belief. The following statement is believed to be approximately correct:

Two kinds of portland cement are recognized, one corresponding to the present standard portland, while the other is early-high-strength portland. Both are to be accepted on 1:3 mortar tension tests.

For normal portland, tests at three and seven days are substituted for the present seven and 28 day tests; the required strengths are 200 lb. at three days and 275 lb. at seven days in place of the present 225 at seven days and 325 at 28 days. Progressive increase in strength is not insisted upon.

For high-early-strength portland, test periods of one day and three days are established, and the corresponding strengths are fixed at 275 and 375 lb., respectively. The content of sulphuric anhydride is allowed to go to 2½ per cent.

Mineral Aggregates

As the sequel of the growth in importance of questions concerning aggregates used in railroad ballast, road surfaces and sewage filters, a symposium on mineral aggregates was arranged, under the chairmanship of R. W. Crum, head of the Highway Research Board. It included twelve papers and occupied two full sessions. Most of the time was given to coarse aggregate, which seems to engage more interest than sand.

Inspection of highway aggregates was dealt with in two papers by R. W. Crum and A. S. Rea (Ohio Highway Department, Columbus). Mr. Crum rather favored the producer; he argued that acceptance when once made should be final, but that in case of rejection the producer should have right to a retest; he also dwelt on the need of liberal tolerances on foreign material in aggregate. He urged that inspectors of aggregates should be chosen of such caliber that their superiors can rely implicitly on their judgment and support their decisions. Mr. Rea reported that practice of state highway departments is divided on the matter of inspecting aggregates at plant or destination, while in construction as a whole probably 90 per cent of all aggregates is inspected at destination. He discussed the problems and difficulties of the two kinds of inspection, including sampling and the necessary field tests (screen test for grading, washing test for silt, colorimetric test for organic matter, weight test, percentage of impurities and soft or flat pieces).

There was some discussion of the propriety of rejecting on visual inspection, on the argument that quantitative reasons for rejections should be on record, but it was pointed out that dirt on stone and similar conditions do not permit of anything other than rejection on visual examination. The sampling difficulty arising from segregation of gravel during shipment and handling was also mentioned; in one instance a shipment of aggregate accepted at the point of production reached the mixer so badly segregated as to warrant rejection, a condition blamed on the user rather than the producer. An unusual case was cited where dust-coated broken stone intended for concrete was accepted but was used for bituminous surfacing mixture, which was then stockpiled along the road: in a hard rain the bituminous material was badly washed because of deficient adherence due to the original dust coating, and the whole mass had to be wasted.

Sand for Concrete and Plaster

Concrete and Plaster Sand—H. F. Gonnerman (Portland Cement Association, Chicago) reviewed present knowledge on selection of sand for concrete, with references back to Vitruvius. Sand, he said, is used "to produce workability and to promote uniformity in the mixture," and "not only the amount used but also the gradation, size and shape of particles, surface characteristics and other properties" affect the result. After briefly considering soundness and cleanness, he discussed grading, mentioning the theories of Fuller and Graf and presenting new results on concretes of different sand gradings but equal slumps, which show a 1:2 range of compressive strength due to grading, but nevertheless fall on a single water-ratio curve.

Sand for mortar and plaster was treated in a paper by J. C. Pearson (Lehigh Portland Cement Company, Allentown), who listed the main properties desired in mortars as plasticity, low volume change, limited soluble content, and strength. Although the fourth is unimportant, it is the only definite one. The author doubts whether grading limits can be set at present, even the wide limits set by the lime committee two years ago (fineness modulus 1.88 to 3.30). Mortars mixed from 35 different sands, to uniform flowtable consistency, varied widely in economy (30 lb. to 42 lb. cement per cubic foot of mortar). In summary, however, he stated that with the present dearth of knowledge "almost any material worth the name of fine aggregate can be used satisfactorily as aggregate for ordinary mortar and plaster; but some, of course, are better than others."

Aggregates for Concrete and Filter Beds

Coarse Aggregates—In a paper "Influence of Coarse Aggregate on Strength of Concrete," F. C. Lang (Minnesota Highway Department, St. Paul) showed that aggregate of low value in the Deval or other abrasion test does not reduce compressive or tensile strength of concrete, though it may reduce the bending strength somewhat. Absorption value has no influence; shape and surface texture are unknown factors. F. H. Jackson (Bureau of Public Roads, Washington) gave confirmatory test results on abrasion loss; these also showed that the strength results follow the water-ratio curve exactly, but give different curves for different aggregates. A. T. Goldbeck (National Crushed Stone Association, Washington) found some evidence of influence of abrasion resistance on strength, and found the nature of the aggregate to affect strength so greatly as to overbalance

the effect of 0.2 increase in water ratio in one instance.

Geological characteristics of coarse aggregate were discussed at some length by F. R. McMillan and George W. Ward (Portland Cement Association, Chicago), with emphasis on the danger of using unsound material. S. H. Ingberg (Bureau of Standards, Washington) reviewed data on relation of coarse aggregates to fire resistance of concrete, stating their order of excellence as (1) calcareous, (2) feldspathic, (3) granite and sandstone, and (4) siliceous aggregates, the latter two classes having distinctly lower fire resistance than the first two. Little is known of effect of sand on fire resistance. Discussion in connection with the question of unsound aggregates indicated that the sodium sulphate test for soundness is distrusted by many, and at best is a warning test rather than a rejection test. Appearance of ledge face is usually (but not always) a safe indicator of stone quality.

Filters and Ballast—An exhaustive review of mineral aggregates for sewage disposal and for railroad ballast was presented by H. F. Kriege (France Stone Company, Toledo). For the severe service of trickling filters proper sizing, cleanness, placing and durability of the material are important, the latter quality to be determined for stone, slag and gravel by twenty cycles of sodium sulphate immersion. For railroad ballast all commercial aggregates show sufficient durability and the main consideration is economy; the merit rating of different materials was quoted as: trap 100, limestone 87, crushed gravel 78, slag 68, screened and pit-run gravel 61.

Road and Paving Materials

Aggregates for Bituminous Mixtures—H. W. Skidmore (Chicago Paving Laboratory, Chicago), in a paper on fine aggregate in bituminous mixtures, showed a large series of test results demonstrating the influence of both sand grading and filler type and amount upon the density, economy and stability of paving mixtures. Stability (shear strength at 140 deg. F.) was shown to increase almost linearly with amount of filler. Prevost Hubbard (Asphalt Association, New York City) considered the coarse aggregate as well as the sand and filler in their effect on stability. Coarse aggregate requires hardness and angularity, neither of which is important in fine aggregate. The nature of aggregates is important; some aggregates appear able to carry a greater film thickness of bituminous cement than others without decrease in stability; the same filler used with two sands of identical grading may give widely different voids and stability, and the mixture of lowest voids is not necessarily the most stable, though in the case of a single set of materials that grading which gives lowest voids is the most stable. However, the degree of stability obtained in laboratory tests cannot always be duplicated on the street.

Earth-Road Aggregates—C. N. Conner (American Road Builders Association, Washington) concluded from a study of practice in low-cost road construction that selection of materials is governed by service experience rather than by standard tests; that soft aggregates in base courses are satisfactory if covered by a relatively thin surface of hard aggregate; and that surfaces to be maintained by blading or dragging should have aggregates limited to ¾-in. or 1-in. size, with a surface mulch of ½-in. material.

Changes in Specifications—Numerous changes occurred in the specifications for road and paving materials. Proposed revisions for broken stone for waterbound base and for bituminous concrete base were approved. The changes are for the purpose of making the specifications more widely applicable without sacrificing quality. Tentative changes in existing specifications for granite block pavement, chiefly in regard to abrasion tests, also were approved. Existing tentative standards for the following materials were advanced to standard: sand for sheet asphalt and bituminous concrete pavement, broken stone for waterbound macadam surface course, broken stone for bituminous macadam and for bituminous concrete surface, and methods of test for the determination of moisture equivalent of subgrade soils in the field.

A tentative standard specification for portland-cement concrete for pavements and pavement bases was not accepted, chiefly because most of the members of the subcommittee which prepared the specification were not present to support the chairman when some slight opposition to the specification arose. Disapproval of the specification was expressed by J. S. Miller if it would produce a richer mix than heretofore used. Prevost Hubbard stated that he believed it would do so, adding that he favored a lean mix for pavement base, as with it expansion cracks will be numerous and small rather than few and wide as with a rich concrete and consequently less likely to come through to the surface. A. W. Dow expressed the belief that density rather than richness of the mix is the governing factor in the development of cracks.

A tentative specification for gravel for bituminous concrete was approved.

Needed Research in Aggregates—Reviewing the entire field, F. H. Jackson (Bureau of Public Roads, Washington) outlined the subjects in which research is needed to provide better working knowledge. Among these are effect of aggregate on quality of concrete and of bituminous mixtures, durability tests, effect of cleanness of surface of aggregate, grading, volume change and stability tests. He recommended that a correlating agency be set up to make research in these fields of maximum value. Prof. A. N. Talbot (University of Illinois) emphasized this recommendation.

Laboratory Studies in Cement

Research in Cement and Concrete—Arrangements have been completed for establishing the long-discussed reference laboratory in cement testing at the Bureau of Standards; the U. S. government and the cement industry have each contributed $12,500. It will not undertake to make check or arbitration tests but will instruct operators and certify apparatus. In this way the cement committee hopes to reduce the wide variations in cement test results which it found two years ago in its inter-laboratory series of comparative tests.

Half a dozen interesting researches in cement and concrete were reported.

F. O. Anderegg and D. S. Hubbell (Atlas Portland Cement Company) studied the rate of hydration of cement by separating different fractions of the ground clinker by air sorting, hydrating them for definite times and observing the percentage of hydrated particles by microscopic count in an oil, refractive index 1.67, from which count the linear depth of hydration was calculated. They found that cement particles 15 to 30 microns in diameter hydrate to a depth of 0.5 micron in 24 hours, 1.5 in seven days, 3.5 in 28 days, and 5 in 90 days; temperature (from 32 to 100 deg. F.) did not

affect the rate, and high-early-strength portland showed no increased depth at 24 hours. The volume ratios hydrated are computed to be 24 per cent at 24 hours, 42 at seven days, 51 at 28 days and 60 at 90 days. In discussion Dr. R. H. Bogue questioned both the method and the numerical results.

Prof. H. J. Gilkey (University of Colorado) showed that broken tensile briquets when placed in water after tying them together by a rubber band will heal over part of the broken face and acquire considerable tensile strength; breaking and healing can be repeated half a dozen times. D. A. Abrams (International Cement Corportation, New York) reported having observed autogenous healing of diagonal tension cracks in a bridge girder sixteen years ago.

In attempting to develop a mortar compression test which would predict concrete strengths, O. L. Moore (Universal Portland Cement Company, Chicago) compared a number of concrete and mortar mixtures and found that 2-in. mortar cubes with Ottawa standard sand and 0.8 water ratio gave the same strength as 3x6-in. cylinders of concrete with water ratio 1.0, at identical age; he attributed the difference in required water ratio to the larger air voids of Ottawa sand, since all the strengths obtained would plot quite smoothly on a single voids-ratio curve. J. C. Brickett described check tests which did not confirm the author's constant ratio between the mortar and concrete, and concluded that Ottawa sand is unsuitable for the purpose because of narrow range between the limit of water segregation and harshness. A graded sand would give more dependable results than standard Ottawa, said H. F. Gonnerman. The author added that he cannot explain the greater air voids in standard Ottawa sand, but finds the same departure from the water-ratio curve with graded Ottawa.

Sugar produced by decomposition of plant débris having been found in several waters, N. H. Roy (University of Illinois) sought a test for sugar. A simple fermentation test was developed, using a pure culture of the bacterium *Aerobacter aerogenes.*

Prof. R. E. Davis and G. E. Troxell (University of California) reported extensive tests of elastic modulus and Poisson ratio for concrete. Strong concrete generally has a high modulus, they find, but there is no quantitative relationship; load applied at an early age increases the modulus at later ages; under sustained load a low total modulus is realized, because of flow, but this modulus is higher for wet than for dry concrete. The value of the Poisson ratio ranged from 0.15 up. and for ordinary conditions was about 0.20.

Admixtures

What Is Workability in Concrete?—Most active interest was aroused (and this at 1 o'clock in the morning, at the close of the last session!) by a paper on admixtures, which brought to the front the lack of knowledge of what is workability and how many qualities are involved. D. A. Abrams studied the effect of fourteen powdered admixtures in his usual careful manner, making all comparisons at constant consistency as measured by the flow table. He concluded:

The workability of the concrete measured by the flow test was not improved by any of the fourteen powdered admixtures tested.

The excess water required to produce the same workability as that of similar concrete without admixture was approximately proportional to the normal consistency of the admixture as measured by the Vicat needle.

All of the commercial admixtures tested must be classed as injurious adulterants, due to excess water required to maintain workability. The reduction in concrete strength was proportional to the excess water.

The colloidal clays of the Bentonite type were most injurious on account of large excess water required as reflected by their high normal consistencies. Loss in strength ranged from about 1.5 per cent to 5 per cent for each 1 per cent of admixture in terms of weight of cement. After the colloidal clays, diatomaceous earth was the most injurious to strength and workability, although the serious loss in strength was confined to early ages.

The slightly hydraulic admixtures, powdered high-calcium granulated slag, precipitator dust and one artificial admixture showed slight increase in strength at early ages, but this benefit was doubtful after ages of seven days.

In general, loss in strength due to admixtures was greater at ages of one to three days than at ages of seven days to three months.

The paper was discussed chiefly by representatives of admixture manufacturers, with the major argument that admixtures increase the workability of concrete regardless of flow-table figures, and that strength is a secondary factor.

Much investigative work is in progress by suborganizations of the committee on concrete and concrete aggregates, but few results were reported this year. Design of concrete, study of variations in the beam test, the flow-table test and other phases of workability, influence of sand bearings on compression tests, drilled cores, effect of impurities in gravel and sand, methods of mixing and placing, and soundness of aggregates, are among the matters in hand.

One investigation reported was the influence of stone dust on the strength and wear-resistance of concrete. A. T. Goldbeck stated the conclusion that each 1 per cent of dust reduces strength by slightly over 1 per cent, probably by increased water requirement; but that wear resistance is not reduced. Another study dealt with the effect of flat particles in gravel; Stanton Walker and C. E. Proudley reported no decrease in strength from as much as 14 per cent of flat particles, and no tendency of the flat particles to arrange themselves parallel to the finished surface of a slab. A third study, by P. J. Freeman, confirmed results given by Morrison and Webb five years ago as to effect of coal in sand. He found that ½ to 1½ per cent coal and lignite in sand decreased the compression strength of concrete 20 to 50 per cent, this decrease being constant for all percentages of impurity within this range, so long as any color is shown in the colorimetric test.

A thorough reorganization of this committee is planned, so as to make it "a relatively small committee of preferably not over 60 members."

A report of developments of special interest to the civil engineering field which occurred at other sessions of the American Society for Testing Materials annual meeting will be given in next week's issue. It will include research and specification work in steel and cast iron, studies of corrosion of steel, cast-iron and nonferrous metals, studies of fatigue under alternating stress, changes in specifications for paving and building brick, research in the penetrability of brick, uses of gypsum as a retardant for portland cement, developments in timber studies and studies on elastic calking compounds.

Correction

In an article on the new Riverside Drive viaduct at New York, published in our issue of June 20, 1929, p. 987, the name of the contractor for the foundation work was incorrectly given. The name should have been the Remo Engineering Corporation.

Water-Works Practice as Reviewed at the Convention of the A.W.W.A.

Abstracts and Discussions of Papers on Canadian Works, Boiler Feed Water, Pumps and Headers, Tanks, Pipe and Pipe Joints, Zeolite and Other Water Softening, Quality and Purification of Water and Other Topics

Engineering News-Record Staff Report

ALMOST the whole time of the many sessions of the annual convention of the American Water Works Association at Toronto, June 24 to 28, was devoted to the presentation and discussion of papers. Of these there were about 50. Most of them were grouped topically and nearly all that were not fell under one or another of a half-dozen topics: boiler feed water, pumps and headers, tanks, pipe and pipe joints, water softening, and quality and purification of water. These main topics were chosen largely both because they are live subjects and to gather material for a proposed supplement to the association's Manual of Water Works Practice. A number of papers relating to Canadian water-works, mostly dealing with water treatment, have been considered as a group in what follows. A report of the business transacted is given in the news section of this issue.

Engineers in Water-Works Management

In the course of a paper on Engineering Ethics Nicholas S. Hill, Jr., consulting engineer, New York City, and president of the Hackensack Water Company, devoted two paragraphs to utility management and finance which related mostly to water-works. He said:

A great field of usefulness for engineers has developed with the growth of municipally owned utilities, particularly in the field of water-works management and financing. The rapidly growing percentage of engineers on water-works staffs is pleasing because it shows an increased recognition of the value of engineering in this field.

How are our public water-supply systems to attain even higher standards than have been maintained in the past? The answer is: more efficiency in administration, finance and operation, as well as sound engineering design and construction. What the water-works of today needs most, however, is freedom from partisan politics and independent administration. Freedom from politics can be obtained by the education of the public and by proper city charters which isolate the water department and treat it as a utility. The success of any business enterprise depends upon its conformity with the fundamental laws of political economy. The United States Supreme Court and other courts have held that when a municipality engages in the water business it conducts a commercial enterprise and is subject to the same rules at law as a private company engaged in the same business. The water department should, therefore, be maintained as a separate entity and be made responsible for the establishment of rates which will secure the revenue necessary not only for its operation but for financing new issues of securities necessary to meet the development of the service. All water revenues should be returned to the water department and applied by it to the needs of that department. In other words, the water works should be self supporting. Water revenues should not be robbed for the benefit of other city departments and the water service thereby crippled. To rob the water department in this way not only is precarious but is unjust to the water consumer, who should not have his water bill increased to ease taxes for sewers, pavements or other purposes. Engineers as a whole, I think, recognize this principle, and the members of the American Water Works Association can do a great public service by helping to educate the public to an appreciation of the necessity of treating municipally owned utilities as private utilities would be treated.

Further on Mr. Hill deprecated the growing practice of engineers submitting competitive bids for their services. This led to the adoption of a resolution asking the governing body of the A.W.W.A. to consider action toward uniting the association on a stand against the practice.

Canadian Water-Works

TORONTO WATER-WORKS: By *R. C. Harris*, Commissioner of Public Works, Toronto—The first pumping engine for supplying water to Toronto was installed in 1841 by the Toronto Gas Light & Water Company. The works, as extended, were bought by the city in 1873 for $220,000. The city built works in 1873-77, taking water from an infiltration basin on Toronto Island. Subsequently this basin was abandoned and water was drawn directly from the lake. A slow-sand filter plant was completed in 1912 and drifting-sand mechanical filters were added in 1918. The filtered water is chlorinated and at periods when chlorination would give rise to objectionable taste superchlorination is used, followed by dechlorination effected by the introduction of sulphur dioxide.

The water plant is administered in three sections: water supply, including construction and operation of intake, filters, pumping stations, reservoirs, etc.; water-main extensions, confined to construction; water distribution, including maintenance of mains, valves, hydrants, and also installation and maintenance of water services, meters and street drinking fountains. An entirely separate high-pressure fire system for the protection of the congested district has been in operation since February, 1909. This is financed as a fire department charge.

TORONTO WATER-WORKS EXTENSIONS: By *William Gore*, Consulting Engineer, Toronto, Ont.—Plans for a new lake tunnel, a filtration plant, a land tunnel for miles along shore, a pumping station, force mains, a reservoir and an ornamental tank have been made and some of the work is about to be let. The present nominal capacity of 90 Imp. m.g.d. is to be doubled, with provision for another 90. The new low-lift pumps and filters will be on the mainland and the old filters and pumps on Toronto Island will be connected with the new works. There will be 40 6-Imp. m.g.d. mechanical filters, with provision for duplication. Superchlorination and dechlorination will be used. The estimated cost of the extensions to be carried out in the near future is $14,300,000.

INNOVATIONS IN WATER TREATMENT IN ONTARIO: By *A. V. DeLaporte*, Chemist, Ontario Health Department, Toronto—Aside from superchlorination and dechlorination of water when bad tastes are threatened at Toronto, the chief innovation is aeration by compressed air, followed by sedimentation, to prevent tastes and odors from water high in organic matter—virtually activated-sludge treatment of water. This process is used at a number of water-works.

UNUSUAL FEATURES OF THE NIAGARA FALLS FILTERS: By *F. A. Dallyn*, Consulting Engineer, Toronto, Ont.—In the new 10-m.g.d. plant recently designed for Niagara Falls, Ont., mild dosage of alum is proposed, by dumping carload lots into the water. The concentrated solution thus provided will be pumped to a hydraulic-jump mixer. For the filter underdrains cast-iron covers over a concrete trough are proposed, with manifolds cast integral with the cover—as used at St. Catherines, Ont. An unusual feature proposed is tapered push joint laterals, supported on concrete haunches.

OPERATION OF A CANADIAN WATER-WORKS SYSTEM: By *W. E. MacDonald*, Water-Works Engineer, Ottawa—By instituting a bureau of purchases and supplies it has been found possible to effect substantial savings. The extended use of electricity has witnessed the installation of electrically driven centrifugal pumps for handling both large and small quantities of water under almost every conceivable condition. The difficulties with frazil ice have been greatly lessened by the use of revolving streams combined with the application of steam. Throughout Canada frost penetrates the ground for a depth of 4 ft., necessitating deep laying of pipe. In Ottawa a covering of 7 ft. is necessary.

Where exposed pipe requires special protection, the Ottawa Water Department wraps it with four layers of felt and a special electric insulating tape, then applies an asphalt compound and wraps with oiled paper, resin paper and an 8-oz. canvas. Finally two coats of linseed oil paint are applied to the pipe.

Pumps and Headers

SELECTING TYPE OF PUMP: By *A. P. Pigman*, American Water Works & Electric Company, New York City—Practically all pumps are driven by steam, internal combustion engines or purchased electric power. In this paper I compare annual fixed charges (including capital and maintenance), labor, fuel or energy for four sizes of plants (average brake horsepower of 1,600, 800, 400 and 160) for the three forms of drive mentioned, taking the diesel engine for the second type. Coal is taken at $3 a ton, oil at 6c. per gallon, electric energy at 1c. per kilowatt-hour, including demand charges. I find that for a uniform pumpage rate, provided the plant is large enough to justify a turbine of over 1,500 hp., a steam plant generally has quite an advantage, but if less than 250 or 300 hp. is required, an electric plant is generally preferable. Between these sizes the diesel plant has a slight advantage, closely rivaled by steam as the sizes approach the higher limit, and by electricity as the lower limit is approached. With a widely fluctuating load, more equipment is required and the low unit investment of the electric plant gives it the advantage. All this is for new plant. For additions to an old plant, the equipment for a given load would be less and the steam and diesel plants, with their low operating costs, would have a greater advantage, and these types would be extended down into smaller sizes than for new plants.

STEAM AND ELECTRIC PUMPING STATIONS: By *J. F. Laboon*, the J. N. Chester Engineers, Pittsburgh, Pa.—Electric power is becoming increasingly popular for pumping station use, and deservedly so, especially where superpower is available. Electric units are low in first cost, convenient in operation, and save labor and space. Where power is available from at least two dependable sources to satisfy Underwriters requirements and reservoir storage is provided, motor-driven pumps become even more desirable, as fire insurance rates remain unaffected and economical operation is possible by maintaining the units at their rated capacities. But if reservoir or standpipe storage is not available, thus necessitating direct pumping, motor-driven pumps are less efficient. This is in contrast to direct-acting steam pumps, which can be governed automatically to maintain pressure requirements at varying outputs without material sacrifice of efficiency. [Actual electrical costs at several plants were then compared with estimated steam costs, taking capital and operating charges into account, with results favorable to electric-driven pumps.—EDITOR.] A few days ago, the water department engineers of the city of Pittsburgh decided to electrify an 80-m.g.d. station. Current is estimated at 6.5 mills per kilowatt-hour.

AUTOMATICALLY OPERATED ELECTRIC-DRIVEN PUMPS. By *R. L. Baldwin*, Burns & McDonnell Engineering Company, Kansas City, Mo.—This paper deals with an application of the automatic method of pump operation, with particular attention to economy. [The subject is gone into in detail with tabulations furnished and a conclusion.—EDITOR.] The efficiency indicated [in this study] is approximately 65 per cent over all, while present operation of direct-pressure motor-driven stations is approximately one-half this.

PUMP DISCHARGE HEADERS AND PIPING: By *F. G. Cunningham*, of Fuller & McClintock, New York City—The writer has known of a number of cases in which the entire or the major part of a city's supply has been cut off or unreasonably endangered by breaks or repairs in header piping.

The functions of a good discharge header may be summarized as follows: (1) to permit any pump, pipe or valve to be isolated for repairs without crippling service; (2) to permit any or all pumps to deliver to any or all supply mains, or at least reasonable flexibility in this respect; (3) to allow of ready operation of essential control valves, especially in emergencies; (4) to provide convenient access for inspection and repair of control valves and connecting pipes. [A number of different header arrangements, bad and good, are shown in the accompanying group of figures, p. 25.—EDITOR.]

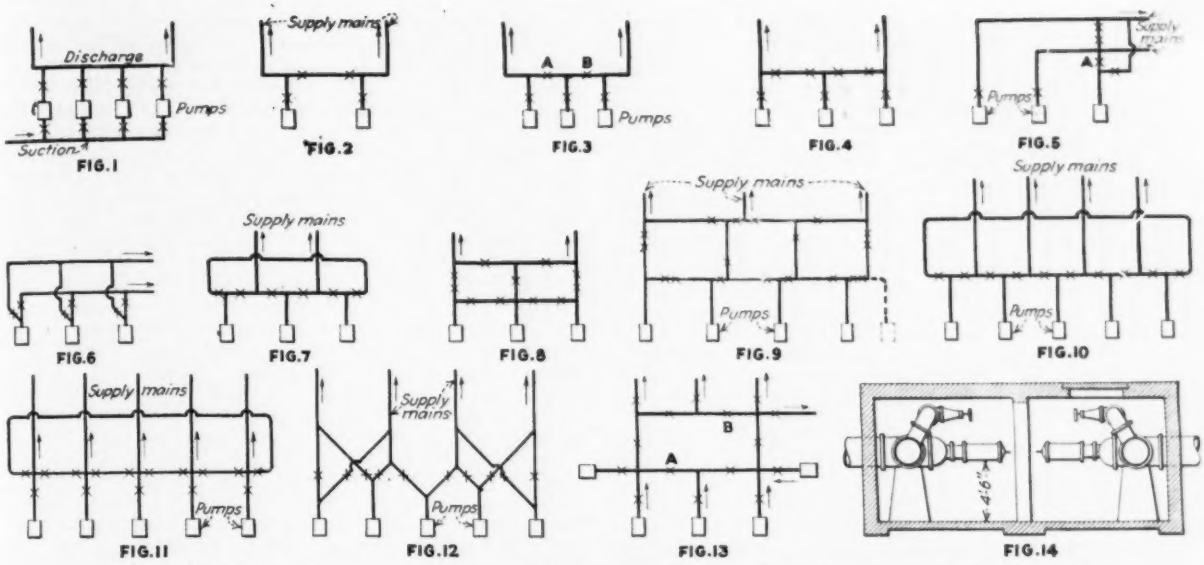
The writer believes that in a suitably arranged header system cast-iron fittings and valves are satisfactory, but they should be rugged in design for a pressure considerably in excess of the working pressure. Where fittings are larger than 16 in. in diameter, it is a good plan to have each of them tapped and plugged at a number of points to make sure that the casting is not unduly eccentric or thin on one side. Pipes and valves in the header system should be flanged. The header should be inclosed in a masonry chamber, with convenient access. In the Memphis chambers (see Fig. 14) there is plenty of space below the header piping and valve cylinders to move any of the valves or fittings across the floor to a point underneath one of the hatchways in the roof.

Because of low pressure on the suction side of the pumps and of the lesser likelihood of breaks occurring there, it is unnecessary to have suction arrangements anything like as thoroughly valved and as complex as discharge headers. Foot valves in suction connections are to be avoided. Check valves on the discharge side of centrifugal pumps are practically essential in all ordinary cases.

Discussion: Most of the extended discussion on the pump group of papers centered in the comparative reliability of steam and electric power. J. E. Gibson, Charleston, S. C., said rain and wind last September cut off electric power for three days. Others told of cutouts by sleet. Still others recited long periods with practically no electric cutouts. Charles E. Burdick, Chicago, said the choice of power rests on which kind will give the most economical service, local conditions considered, including cost of coal and current. He thought electricity as reliable as steam but there must be a reserve. A. Cary Hutson, of the National Board of Fire Underwriters, called attention to the fact that in the high-pressure fire-protection systems of New York, Philadelphia and Baltimore, electricity is used at the first, internal combustion engines at the second and steam at the third. Either one is safe, if there are sufficient reservoir units and reservoir sources of energy.

Boiler Feed Water

BOILER OPERATION AND FEED-WATER TREATMENTS: By *Sheppard T. Powell*, Consulting Chemical Engineer, Baltimore, Md.—One of the important developments in feed-water treatment in the light of radical changes in boiler practice during the last ten years has been the combination of various forms of water-purification processes. The combination of chemical and zeolite softening, additions of coagulants with softening reagents, continuous blow-down systems and steam purifiers have revolutionized feed-water treatment. No new chemicals of importance have been produced for water conditioning, but there has been a marked increase in the use of some softening reagents. This is particularly so in the case of phosphates and sodium aluminate. Investigations to determine methods of treatment to inhibit embrittle-



VARIOUS PUMP HEADER ARRANGEMENTS BAD AND GOOD WITH VARYING NUMBERS OF PUMPS, VALVES AND DISCHARGE LINE (SEE CUNNINGHAM PAPER, PAGE 24)

Fig. 1—Poor arrangement in recent installation. The repair of any piece of pipe in suction or discharge lines or of any valve would put the entire station out of service.

Fig. 2—One pump and one line out by any break or valve repair.

Fig. 3—One pump and one line out by single break in line. Two pumps and one line by valve repair.

Fig. 4—One pump and one line out by repair of line or valve.

Fig. 5—One pump and one line out by single break in line. Two pumps and one line out by repair of a valve.

Fig. 6—With this arrangement no serious break can shut down more than one pump and one supply line, which result would occur through the repair of any one of the six valves.

Fig. 7—Consequences of the most serious valve repair same as in Fig. 6, except the chances of such occurrence are somewhat less, since there are only four valves that can produce that result.

Fig. 8—Two advantages are gained as compared with preceding cases: (1) While the repair of certain valves can shut down either one pump or one supply main, no single repair can shut down both a pump and a supply main. (2) Connections are such that there is less likelihood of emergencies requiring the stopping of one pumping unit and the starting of another, which operation might be embarrassing.

Fig. 9—With this arrangement of cross-connections it is possible to continue pumping to all of the mains with all pumps except the one that might be directly affected by a break.

Fig. 10—This layout can be expanded or contracted indefinitely to fit any number of pumps or supply lines. It is based upon the reasonable assumption that one pump and one supply main, but not two pumps or two mains, may be put out of service simultaneously without impairing service.

Fig. 11—Here, as in Fig. 9, it is unnecessary to provide valves in the individual discharge pipes of the various pumps, because any pump can be isolated by closing the header valves lying on either side of the tee for the pump connection.

Fig. 12—Another application of the idea illustrated in Fig. 6; that is, of splitting each pump discharge into two pipes, each leading to a different supply main. Arrangement equivalent, as regards the number of valves and the results produced by the repair of a valve, to the arrangement in either Fig. 10 or Fig. 11 if the valves in the pump leads of the latter be omitted.

Fig. 13—Unskillful use made of the number of valves and fittings installed and the failure to provide adequately for maintaining service. Repairs to valve *A* would shut down three pumps, which comprise 75 per cent of the station's capacity. Repairs to valve *B* would shut down three of the four supply mains.

Fig. 14—Section of Memphis header chamber.

ment of boiler steel have been responsible for the increased use of phosphate. Both disodium and trisodium phosphate has been used and monophosphate is now being offered. Inhibition of corrosion of boilers, heaters and condensers by electrolytic methods has also continued to attract attention and a number of successful installations have been made lately. Research is now being conducted at two universities to determine the actual cause of this phenomenon.

DISSOCIATION OF WATER IN STEEL TUBES AT HIGH TEMPERATURES AND PRESSURES: By *C. H. Fellows*, Detroit Edison Company—During the initial survey of feed-water conditions in a new power plant of the Detroit Edison Company, which is to operate with untreated distilled water, experiments were made to determine the changes that water and steam undergo from the economizer through the superheater. The presence of small amounts of hydrogen in both the saturated and the superheated steam indicated the probable dissociation of the steam in contact with steel at high temperatures. This led to tests at 420 lb. per sq.in. and with temperatures from 1,000 to 1,400 deg. F. on low-carbon steel and chrome-steel tubes, the inside surfaces of the tubes in both cases having first been pickled. The tests showed (1) that the decomposition of metal increases as the temperature of the surface over which the steam passes is raised; (2) that the rate of decomposition of the metal decreases as the thickness of the oxide formed on the surface increases; (3) that variations of steam pressure within the limits employed did not affect the rate of decomposition of the metal; (4) that decomposition of the low-carbon steel proceeded faster than the chrome steel. Furthermore, dissociation increased with a decrease in steam velocity. Also, secondary combustion may produce temperatures that will cause dissociation.

DE-AERATION TO PROTECT HOT WATER PIPING: By *J. R. McDermet*, the Elliott Company, Jeannette, Pa.—Removal of dissolved gases from water to prevent corrosion has been practiced in power plants for about eight years. During this time it has gradually been extended to protect hot water piping in large buildings. Of the two processes employed, de-activation and de-aeration, the latter only is practicable for large quantities of water; the former, depending upon the corroding reaction between water and scrap metal, requires apparatus prohibitive in size for large quantities of water. De-aeration can handle, in feasible size of apparatus, any quantity of water which is used in a heated condition, but while it is applicable to cold water the uses of the latter are so varied and so extravagant that its treatment has not been commercially practicable. By far the largest use of de-aeration has been in the preparation of boiler feed water in steam power plants. Waters high in calcium are softened by lime-soda and sometimes by zeolite treatment. Zeolized water when heated has a narrow zone of attack on the piping network due to the fact that corrosion exhausts itself in a short distance of flow.

PREVENTION OF LOCOMOTIVE BOILER PITTING: By *C. H. Koyl*, Engineer Water Service, Chicago, Milwaukee, St. Paul & Pacific Railroad—By treating locomotive feed water, some 10 per cent of coal and water consumption can be saved. It has been found that where treated water is used, locomotive boilers pit only in the front half, because the oxygen in the air dissolved in the feed water does not escape into the steam space until the water is halfway back to the firebox. A four-year test in our worst pitting district showed that a boiler with an open feed-water heater

had not a single pit, while a companion boiler without such a heater had lost more than two complete sets of flues.

Discussion: F. N. Speller, National Tube Company, stated that in a water of low alkalinity further reduction of the free oxygen would be necessary, so that the conclusions reached by Mr. Koyl as to the two test locomotives do not necessarily hold for other boiler conditions. The fact that the tubes in one of the boilers pitted at one end and not at the other indicates that the tube material is of secondary importance compared with the composition of the boiler water and the operation of the boiler.

WATER CLARIFICATION FOR INDUSTRIAL USE AND SOFTENING FOR BOILER FEED: By *J. A. McGarigle*, Permutit Company of Canada, Toronto, Ont.—In the clarification of water for industrial plants, mechanical agitators to help floc formation are valuable. They reduce the necessary size of settling tanks. For soft waters of low turbidity and high color the use of clay in addition to agitators has been an aid in decolorization. Vertical steel settling tanks have many advantages over concrete horizontal-flow settling tanks.

Conclusions as to softening boiler feed water are: (1) The cost of distilling water by the use of evaporators has been found in the case of a number of users to be an average of 55c. per 1,000 gal., against only 5c. for treatment by hot lime-soda or zeolite. (2) Softening ahead of evaporators keeps the evaporators clean and prevents capacity of evaporators from falling; also keeps hardness from getting into the boiler due to priming of the evaporators. (3) Hot lime-soda treatment, producing an effluent with a hardness of 1.5 grains per gallon, has been found insufficient for high-pressure boilers, so that now phosphate is used after the hot lime-soda treatment. This adds considerably to the operating costs. (4) The recently suggested increase in the sulphate-carbonate ratio makes it necessary to provide secondary treatment for this ratio adjustment with hot lime-soda plants. The increase in this ratio after hot lime-soda treatment involves the danger of production of hard calcium sulphate scale, which has frequently been found to cause overheating of boiler tubes. (5) A comparison of zeolite and hot lime-soda treatment on a typical water like Lake Michigan shows that zeolite treatment has lower operating costs, lower hardness in the effluent and avoids the suspension in the boiler of salines which are present in the case of hot-lime soda.

Trend Toward Tanks of Lesser Height and Flat or Flatter Bottoms

ELEVATED STEEL TANKS: By *George T. Horton*, President Chicago Bridge & Iron Works—Quite elaborate studies of storage tanks in the oil industry indicate the most economical height to be from 46 to 48 ft. These tanks are universally built directly upon the ground, the only foundation work usually done being the removal of the top soil and leveling of the exposed surface. I see no reason for the construction of such extensive foundations as are usually placed under water tanks.

Elevated steel tanks of earlier years were practically all built with hemispherical bottoms. A few conical bottoms were tried out and discarded except in special instances, the most notable being those for railroad service. As demands for ever-increasing capacities developed, certain inherent difficulties in the hemispherical bottom tank appeared. If we endeavored to limit the total height of a tank in order to prevent an undesirable range of head, the diameter would become so great that the bottom would be out of all proportion to the cylindrical part of the tank. We obviated these difficulties, in part, by making an ellipsoidal bottom, the vertical depth of which is but half that of the hemisphere.

An ellipsoidal bottom tank answers very well in capacities up to 0.5 m.g., constitutes an improvement in all sizes and is the explanation of why so many of our large tanks have been so built. Unfortunately some of the stresses in an ellipsoidal bottom are compressive rather than tensile. These compressive stresses in tanks of over 1-m.g. capacity are of sufficient magnitude to necessitate an increase in the depth of the bottom, causing an increase in the range of head, and thus setting up a vicious cycle. More simply stated, when there is a limit to the total height of a tank, there is also a limit to the size of that tank if it be of the suspended bottom type.

It is not practicable to build a hemispherical bottom tank containing more than 0.175 m.g., nor an ellipsoidal bottom with more than 3 m.g., *the total height in each case being limited to 25 ft.* While we have not as yet been called upon to build many tanks so limited, it is not unlikely that the future will bring such calls. [Italics ours.—EDITOR.]

The suspended bottom, due to the refinements required in its construction, is the most expensive part of a tank, and as its size is increased greater stresses necessitate heavier material. It is evident, therefore, that a point will be reached at which the additional material required in a suspended bottom will more than offset the cost of beams and girders necessary to support a flat bottom. At this point the economies in a suspended bottom tank disappear.

I have recently studied this subject sufficiently to announce that tanks over 1-m.g. capacity may be built with flat, or approximately flat, bottoms which will cost less than tanks of the same capacity with suspended bottoms. Stated more specifically, and of course referring to equal capacities, I am sure that an elevated tank with an approximately flat bottom, the height of which will not exceed 25 ft., can be built for less than can an elevated tank with suspended bottom, the total height of which will be more than 50 ft. My references to the height of a tank apply to the tank only, and not to the height of the supporting tower.

Zeolite and Other Water Softening

REDUCTION OF CARBONATE HARDNESS BY EXCESS LIME DECARBONATION: By *Charles P. Hoover*, Chemist-in-Charge Water Softening and Purification, Columbus, Ohio, and *James M. Montgomery*, Water-Works Manager, Piqua, Ohio—The purpose of this paper is to describe a process by which the carbonate hardness can be reduced to the solubility limit of calcium carbonate and magnesium hydroxide. Excess lime recarbonation has been in continuous use at Piqua, Ohio, since June, 1927, and has since been used in Columbus, Marion, Delaware, Greenville, Newark and other Ohio plants.

If lime is added in sufficient excess, it not only will convert the bicarbonates to normal carbonates but will precipitate practically all of the magnesium salts as magnesium hydroxide. The excess lime required to precipitate the magnesium compounds to the lowest possible limit has been found at Columbus and Piqua to be that amount necessary to give the water a caustic alkalinity of approximately 40 p.p.m.

By this process (1) carbonate hardness can be reduced to practically the theoretical limit, (2) consistent reduction in hardness can be made irrespective of temperature, (3) cost of softening is reduced, (4) carbon-dioxide content of softened water is reduced, (5) removal of magnesium eliminates much of the scum left in pans and bathtubs by the reaction of the water with soap.

During the nineteen years of operation of the Columbus plant before recarbonation, the alkalinity of the softened filtered water averaged 55 p.p.m., compared with an average of 30 p.p.m. during the past three months' use of recarbonation, a gain of 25 p.p.m. To accomplish this, 1.7 grains of additional lime are required, or 243 lb. per million gallons. At $6.71 per ton this amounts to 81c. per million gallons. If this hardness were not removed by the use of this process, then to meet the standard of hardness maintained at the Columbus plant it would be necessary to remove the equivalent of this hardness with soda ash or by the use of zeolite. To remove 25 p.p.m. with soda ash at $27.62 per ton would cost $3.14 per million gallons. The saving per day is the difference between $3.14 and $0.81 multiplied by 30 (m.g.), or $69.90. To remove 25 p.p.m. with zeolite 0.35 lb. of salt per 1,000 grains hardness removed, with salt at $6.50 per ton, would cost $1.67 per million gallons. In addition to the cost of salt there would also be some extra expense for wash water.

The question now arises: Have the benefits of recarbonation as originally used been lost by using it as herein described? In so far as the operation of the filters is concerned it has. From 25 to 30 p.p.m. of hardness is removed by being deposited on the filter sand. In time

the sand grains will become incrusted just as they did before recarbonation was developed. Judging from the rate of growth of the filter sand at Piqua, unless some means of removing the incrustation is employed, it would probably be necessary to replace the sand after about ten years of operation.

Various methods of removing this burden from the filters are being tried. At Piqua the incrustation has been removed successfully by taking the filter out of service after two or three months' use and then allowing the highly acid water from the carbonation scrubber to flow up through the sand and out through the wash water troughs. After two or three weeks of this treatment the incrustation has been dissolved and the filter is again ready for service. Return of sludge, the addition of coagulating materials and filtration through coarse filtering materials are some other schemes that are receiving attention.

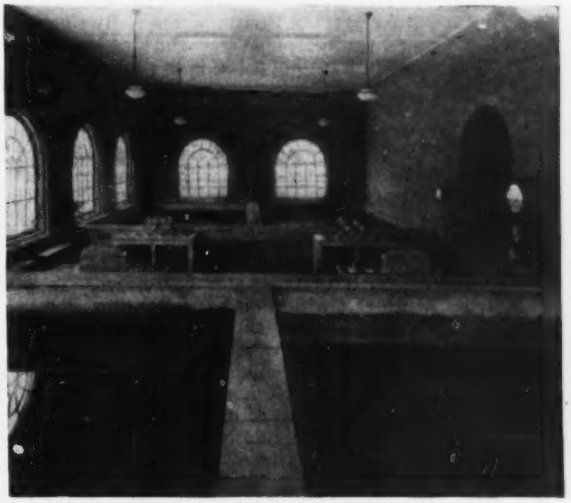
WATER-SOFTENING OPERATING EXPERIENCES AT MARION, OHIO: By *Martin E. Flentje*, Superintendent of Filtration, Community Water Service Company of New York, and *Charles C. Whysall*, Chemist in Charge, Marion Plant—This plant is unique because of (1) the extreme hardness of the raw well water, 700 p.p.m.; (2) all steel construction above ground; and (3) use of double recarbonation to produce low alkalinities. The plant consists of motor-driven pumps; mechanical mixing basin 20 ft. in diameter; a settling basin 120 ft. in diameter equipped with revolving scrapers; a recarbonizing chamber, and a 2-m.g. soft-water basin. All the basins mentioned are of steel, 24 ft. high. The hardness of the plant effluent averages 150 p.p.m., with a total alkalinity of 35 p.p.m. This is effected with 14.2 lb. lime per million gallons per 1 p.p.m. of alkalinity removed, and 9.9 lb. per million gallons of soda ash to 1 p.p.m. non-carbonate hardness removed. Double carbonation removes about 30 p.p.m. alkalinity at an estimated cost of 1c. per million gallons per 1 p.p.m. removed, while the average cost of removing 1 p.p.m. hardness by lime-soda ash is 9.7c. per million gallons.

TRENDS IN ZEOLITE WATER SOFTENING: By *W. J. Hughes*, Mechanical Engineer, and *H. B. Crane*, Principal Assistant Engineer, International Filter Company, Chicago—Advances in softening water by zeolite for industrial purposes have led to an increasing use of this process for softening municipal supplies. The reagent used to restore the zeolite, common salt, has gone down in price from its former rate of $15 to $20 per ton, delivered, fifteen years ago to $7.50 to $10 now. Comparative costs of chemicals for the two methods of treatment are favorable to the use of zeolite. The other change to the benefit of zeolite as a water softener for municipalities is the substitution of open for pressure zeolite softeners. [The paper outlines a plant of this type at Mangum, Okla., which was described at greater length in *Engineering News-Record*, June 6, 1929, p. 900.]

ZEOLITE WATER-SOFTENING EXPERIENCES: By *D. E. Davis* and *J. T. Campbell*, J. N. Chester Engineers, Pittsburgh—Operating data for the 4-m.g.d. pressure plant of the Ohio Valley Water Company, about 6 miles below Pittsburgh, and the 2-m.g. Sewickley, Pa., open-type are summarized as follows:

	Ohio Valley Water Co.	Borough of Sewickley, Pa.
Type	Pressure	Open
Number of units	4	4
Nominal capacity in gal. per 24 hours	4,000,000	2,000,000
Area per sand bed in sq.ft.	208	181.5
Cubic feet of sand per unit	670	470
Direction of flow	Downward	Downward
Rate of flow in gal. per sq.ft. per min.	4.3	2
Rate of flow control	None	Rate controllers
Wash rate in gal. per sq.ft. per min.	4 to 6	6 to 13
Sand rise during wash in inches	4.7 to 5.6	5.6 to 18.5
Pounds of salt per 1,000 grains removal	0.344	0.334
Grains removal per cu.ft.	3250	4004
Salt dose	Variable	Constant
Grain characteristics, effective size in m.m.	0.31	0.285
Grain characteristics, uniformity coeff.	1.50	1.50
Wash brine and rinse water in per cent of plant output	10.5	6.5
Head	32	5

The open softeners at Sewickley, being designed for use as filters as well as softeners, operate at the usual filtration rate and correspond closely to rapid-sand filtration practice, as regards head losses, sand rise, etc. The pressure softeners operate at about twice the rate of the open filters, but require materially greater head, 32 against 5 ft. The open units permit of ready and continuous observation of the process, which is difficult in the closed units.



FILTER ROOM OF ZEOLITE WATER-SOFTENING PLANT, SEWICKLEY, PA.

ZEOLITE WATER-SOFTENING HOUSE, SEWICKLEY, PA.

Quality and Purification of Water

CROSS-CONNECTION ELIMINATION IN NEW YORK STATE: By *C. A. Holmquist*, Director, and *Earl Devendorf*, Associate Director, Division of Sanitation, New York State Department of Health—To date the department just named has authorized the installation of 60 fire-pump automatic chlorinators at 55 industrial plants having cross-connections with public water supplies. Before such installations are permitted, local governing conditions are taken into account. In six cases applications for a permit were denied because the fire-pump supply was too polluted to warrant reliance on chlorination. Where fire-pump chlorinators have been installed, the department has insisted on replacing the old iron-body double-check valves with the all-bronze type. At the time of writing the paper, some of the fire-pump chlorinators had been in use for about six months, and the majority of them for at least four months. The reports indicate that, with minor exceptions, all these fire-pump chlorinators have operated satisfactorily; where not, corrections have been made.

MECHANICAL EQUIPMENT FOR WATER TREATMENT: By *C. T. Leander*, Branch Manager of The Dorr Company, Toronto—Almost any type of treatment may be broken up into groups of interconnected unit operation, such as aeration, pre-

sedimentation, chemical coagulation and (or) chemical softening, sedimentation, filtration and chlorination. This paper is confined to the unit operation of free sedimentation, chemical softening and chemical coagulation, their relationship to each other and other appliances. [The paper then describes briefly various Dorr appliances and presents corresponding flow sheets. Data for a number of installations were given arranged under different classes of water.—EDITOR.] The elimination of the difficulties inherent in the operation of intermittently cleaned settling tanks has undoubtedly been the forward step in many waterworks recently built or remodeled.

MANGANESE DIOXIDE DEPOSIT IN CATSKILL AQUEDUCT: By *Frank E. Hale*, Director of Laboratories, Department of Water Supply, New York City—Formation of a brown deposit on the walls of the Catskill aqueduct to a thickness of 1 in. near the Ashokan reservoir occurred prior to chlorination of the water and reduced the discharge capacity of the aqueduct. Following chlorination the deposit became thinner, became detached in large areas and had less effect upon the available capacity of the aqueduct. It was found that the brown deposit was manganese dioxide, and it was concluded that this resulted from the absorption of alkali from the cement.

NATURAL AND ARTIFICIAL PURIFICATION: By *Charles H. Spaulding*, Superintendent of Water Purification, Springfield, Ill.—The purpose of this paper is to summarize studies of the B. coli content of the Sangamon River at Springfield, Ill., before and after the inauguration of complete sewage works at Decatur, Ill., 55 miles up the river, and compare the protection to the water supply of Springfield afforded by self-purification of the water alone with the added effect of sewage treatment at Decatur and water treatment at Springfield. In terms of B. coli, stream self-purification leaves 1.7 per cent residual, sewage treatment 44 per cent, and water purification 0.0003 per cent of the B. coli load which would otherwise be delivered to the water consumers. In other words, artificial water purification has 5,700 times the value of natural purification and 150,000 times the value of sewage treatment in this particular case. The writer hastens to disclaim any attempt to discredit sewage treatment in general or particular. A conclusion which he would most emphasize is that conservation of natural purification in our streams is important element in any conservation policy.

EFFECT OF MICRO-ORGANISMS ON FILTRATION: By *John R. Baylis* and *H. H. Gerstein*, Bureau of Engineering, Chicago, Ill.—[The paper was addressed particularly to Lake Michigan water, at Chicago. Only portions of general interest are here extracted.—EDITOR.]

It is believed that sedimentation offers the most practical means of removing micro-organisms in most instances. Where the water goes through storage reservoirs of several days' capacity prior to chemical treatment and filtration, chlorine or copper sulphate may be used to kill the organisms. Then many of them will gradually settle to the bottom. When it is not possible to do this and it is necessary to take the water as it comes to the plant, a quick settling flocculation must be produced by adding mud to the water, as at Louisville, or by forming a crystalline precipitate in the water.

OTHER PAPERS—In the course of an account of a typhoid outbreak on the steamer "Lake Gaither," by *I. W. Mendolsohn*, of the U. S. Public Health Service, and others, it was stated that this is the only typhoid outbreak of record since the Public Health Service began supervision of water supplies on interstate vessels in 1920. Before that time there were eleven outbreaks of record among passengers and crews and more than 2,100 cases of gastro-intestinal trouble, 162 cases of typhoid fever and eleven deaths. Present supervision now covers 2,400 vessels and 300 water supplies.

Under the hopeful title, "Pure Stream Movement Will Accomplish Its Purpose," a plea for cessation of stream pollution was made by *Scotland G. Highland*, Clarksburg, W. Va. Education and appeals to the public spirit as regards pollution by industrial wastes as well as by municipal sewage were urged. Solution of industrial wastes problems is a task for manufacturers, whose "experts are best fitted" to solve problems, which, shared jointly, would be a small burden on any one plant.

A standard valve for chlorine containers under 15 tons capacity was described and specifications given in a paper by *Robert T. Baldwin*, secretary, Chlorine Institute, New York City (see advance printing, *Jour.* A.W.W.A., June, 1929). This device is the outcome of a resolution adopted in 1926 by the engineering section, A.P.H.A., proposing cooperation by that organization, the A.W.W.A. and the Chlorine Institute. Another paper preprinted in the June *Journal* was on "The Use of Activated Carbon in Removing Taste-Producing Substances From Water," written by *John R. Baylis*, physical chemist, Bureau of Engineering, city of Chicago.

HYDROGEN-ION MEASUREMENT: By *Crandall Z. Rosecrans*, Development Department, Leeds & Northrup Company, Philadelphia—After reviewing the various apparatus now in use, plant chemists and operators were advised to use the dip-type electrode and familiarize themselves with pH measurements in general and pH values in their own particular plants.

Pipe and Pipe Joints

FIELD CHLORINATION OF WATER MAINS: By *Joseph S. Strohmeyer*, Assistant Civil Engineer, Water Department, Baltimore, Md.—For the past five years all water pipe laid in Baltimore has been disinfected before use. To provide available free chlorine at the rate of 100 p.p.m. requires 0.6 lb. of chlorine per 100 cu.ft. of water. The pipe must be mechanically cleaned and flushed before chlorine is introduced and it must stand fully 24 hours before it is emptied.

Discussion: W. W. Brush said that for many years New York City has chlorinated new mains. The same practice is followed when mains are cut for repairs or for hydrants or valves. Bacterial tests are used to control the chlorination period. Dr. F. E. Hale, New York City, said that it is hard to eliminate B. coli lodged in sand in the open space between bell and spigot and on the bottom of pipe. Arthur E. Gorman stated that when he was at Chicago disinfection like that used in New York was practiced.

CEMENT FOR PIPE JOINTS: By *O. G. Goldman*, Assistant Superintendent, City Distributing Department, Spring Valley Water Company, San Francisco, Calif.—Cement was first used on the Pacific Coast for making joints in cast-iron water pipe 40 or 50 years ago at San Jose and Redlands. A little later Los Angeles tried it, but not until 1911 did the cement joint come into common use. Long Beach was probably the first to use it extensively, closely followed by Los Angeles. Portland, Ore., followed in 1916, San Francisco in 1917 and other cities at about the same time.

In San Francisco we have had the joints in service for twelve years under an average pressure of about 50 lb. and a maximum of over 150 lb.—under all conditions ordinarily found in a rather large distributing system. The joints have proved entirely satisfactory. They have stood settlement, vibration and shock as well as lead joints in the system. When necessary the cement can be chipped out, using a long chisel. An 8-in. joint can be cut out in twenty minutes. One day is usually allowed for the cement to set, although we have successfully turned water into a line in which some of the joints have been in place only fifteen hours.

Making cement joints is simple. The pipe is placed in the ditch, spigot in bell, the same as for lead joints. The calker is equipped with a pail of water, a portion of a sack of cement, yarn, a flat pan about 12x18 in., a small trowel, yarning iron, a set of calking tools and a pair of cotton gloves. The calking irons are the same as for lead except that one extra tool, more like a yarning iron than a calking tool, is carried, to be used in ramming the cement into the joint. The point of this tool is 6 in. long, 1 in. wide and ¼-in. thick.

The calker first yarns the joint. Next enough cement for one joint is put in the pan and spread. This cement is then sprinkled with water, using a piece of yarn, and thoroughly mixed, using the trowel. When ready for use the cement should be wet enough to mold and yet dry enough to crumble when dropped a distance of 12 in. The calker then places the pan under the joints to be made, takes a handful of cement, always using a gloved hand, and with a cupped hand holds it up against the joint opening. With the cement calking tool he then forces the cement into the opening, moving the hand around the joint opening until it is about half full. This cement is then calked as hard as possible,

the joint refilled and recalked until the cement is about flush with the face, no bead being put around the outside.

A man can make sixteen 8-in. joints in a day, other sizes in proportion. The cement used is about 1 lb. per inch diameter, including normal loss. Besides their low cost, cement joints assist in insulating mains against electrolysis, although this is not an important factor in cast-iron pipe. They are placed in steel mains, simply for their insulating value. Complete insulation is afforded by three sets of cement joints, separated from 3 to 4 ft. The joints are made by using steel bands 12 in. wide and 1 in. larger than the outside diameter of the pipe. The end of the pipe is inserted under each band 4 in., the other 4 in. being filled temporarily by a wooden form. The area between the pipe and band is then filled with pure cement hammered into place. The wooden form is then removed. This type of insulating joint should not be used on steel mains where any amount of surging or water hammer is likely to occur, as the joint is soon destroyed, the cement ring being rigid compared with the steel main, and cracking badly after the first surge or so, thereby causing the joints to leak. *References:* See also articles by Clark H. Shaw, Vol. 83, *Trans.* Am.Soc.C.E.; by George W. Pracy, Vol. 7, *Jour.* A.W.W.A.; by William Wheeler, Vol. 37, *Jour.* N.E.W.W.A.; and by William Henderson, Vol. 44 of *Gas Age.*

EFFECT OF RIGID JOINTS ON PIPE-BELL STRENGTH: By *W. W. Brush, Chief Engineer,* Department of Water Supply, New York City—Both experience and tests show that the bell is the weakest point in cast-iron pipe acting as a beam and that for the majority of breaks in the pipe body the main cause is flexibility of the jointing material. During 1926, of 135 breaks in 4- to 48-in. leaded-joint pipe in New York City, for which clear description of the breaks were had, 64 were transverse, 44 were longitudinal splits at the bell end and 27 were longitudinal splits or blowouts at or near the center. In Manhattan Borough, where the most extensive foundation disturbance occurs, there were 62 clearly decided breaks. Of these, 46 were in 6-in. pipe, with 29 breaks across the pipe barrel, 11 at the bell end and 6 center splits or blowouts, indicating that in this size pipe, with lead joints, the bell is the least likely place to give way. For 8-in. pipe the breaks were too few to draw conclusions; but for 12-in. and larger sizes it appears that the bell is the point most likely to yield on account of settlement. Tests at the Florence foundry, Jan. 9, 1929, intended to get data on sand-spun and sand-cast (pit-cast) pipe when acting as a beam, brought the writer the information that it was necessary to make a stiff joint, using zinc, or the pipe will not break except after excessive deflection, while with a zinc joint it was possible to break the pipe at the bell with little deflection, for either kind of pipe. The pipe tested were of 8-in. diameter; with actual thickness, 0.557 in. for sand-cast and 0.505 in. for sand-spun, with supports 11½ ft. apart. The breaking load at the bell was 10,000 lb. for sand-cast and 15,000 lb. for sand-spun; breaking load at center of pipe, 25,500 and 31,200 lb. The writer advocates no particular form of jointing material, since conditions differ in various cities, but believes that more attention than heretofore should be given to the design of the bell of cast-iron pipe.

Other Papers—In a paper describing the new welded steel pipe line at Springfield, Mass., Allen Hazen related how twenty years ago he had recommended that Springfield's water supply be conducted to the city in a single steel line rather than in a double line as was proposed, but that the single line be fitted with such "extravagances" as good anchorages, the best valves obtainable and lightning rods as proof against electrolysis, and that it be designed with an exceptionally low unit stress. This line, which is now being supplemented by the new welded line, has never been relieved of pressure during its twenty years of service. It is to be studied carefully for coefficient of flow, tuberculation and complete tightness as soon as the new line is carrying the water supply.

The new welded line was described in *Engineering News-Record,* July 19, 1928, p. 101. Facts not given in that article but mentioned by Mr. Hazen were: That an attempt was made to reduce any tendency toward brittleness in the vicinity of the weld by using a comparatively soft fire-box steel; that fatigue tests made on specimens cut from the pipe showed that many of them could be bent back and forth 200 times before fracture in the weld metal; and that within the city and at highway crossings the line was completely incased in concrete.

In a scheduled discussion of welded pipe lines, Samuel Martin, of the General Electric Company, described the work on the Springfield lines which was done by the multiple-arc process, a process using two arcs about 8 in. apart, the first arc depositing from a solid wire electrode and the second utilizing an electrode with a steel core surrounded by a flux material. F. H. Stephenson, engineer of water system, Detroit, stated that welded pipe is considered superior on every bid in Detroit, that beads should be deposited in two or more layers and that the best welds are produced by welding joints inside and outside. J. F. Lincoln, of the Lincoln Electric Company, explained the new carbon-arc process known as the "electronic tornado," in which a special flux is used, producing gases that protect the arc from the air and other disturbances, giving it a more concentrated and effective action. E. E. Shanor, Petroleum Iron Works Company, in describing his company's welding practice, spoke in favor of coated electrodes. New York City practice was described in a paper by William Flannery, of the Department of Water Supply, Gas and Electricity. Ductility as shown by the bend test he believed to be the most significant of the characteristics of a welded pipe joint.

In a discussion of steel plate pipe lines, F. G. Cunningham, of Fuller & McClintock, outlined briefly the features of the new Wanaque line in northern New Jersey, which represents the first use of wrapped steel water lines in the eastern United States.

R. W. Reynolds, superintendent, West Palm Beach Water Company, described an ingenious method he is using for placing cement lining in reclaimed galvanized-iron pipes, diameters up to 2 in. The lining costs about 2½c. per linear foot; this cost carries no overhead, since the work is done by the company's forces at odd times. In lining the pipe, about 40 lengths are stood on end in a rack and cement is poured into the top through a cone. A torpedo or mandrel is then pulled up through the pipe, followed by another torpedo some distance behind. The first torpedo is ¼ in. less in diameter than the pipe and the last torpedo is only ⅛ in. larger. The purpose of the first torpedo is to center the hole, while the second presses the lining against the walls of the pipe. It is necessary that the torpedoes be far enough apart that the cement sets slightly before the second torpedo is pulled through. Mr. Reynolds stated that an unusually smooth lining was obtained and that the completed pipe withstood quite rough handling without damage.

A lantern-slide talk on pipe durability, with special relation to corrosion, was presented by H. Y. Carson, National Cast Iron Pipe Company, Birmingham, Ala. In discussing the paper, Allen Hazen took a hopeful view of future cutting down of pipe tuberculation by the use of better interior protection and by de-activating the water.

Rio Grande Irrigation Project Delayed

Although the Middle Rio Grande Conservancy District has sold $2,000,000 in bonds and has optioned an additional $3,000,000, this sale is conditioned upon approval by the Supreme Court of New Mexico. If the decision is favorable the money will be available for carrying out the construction program on this combined project for irrigation, drainage and flood control. Much of the excavation of drainage ditches and irrigation canals will be undertaken by the district forces, owing to the necessity of keeping the present irrigation system in service until the new system can be placed in operation. Of work to be done by contract, the principal item is the El Vado dam, a gravel and rock-fill structure 175 ft. high. J. L. Burkholder is chief engineer of the district. This project was described in *Engineering News-Record,* March 10, 1927, p. 400.

News of the Week

Two New Trunk Lines Proposed for Eastern U. S. by Wabash R.R.

Would Consolidate Nine Existing Lines—Competing System Included in Plans

APPLICATION was filed with the Interstate Commerce Commission July 1 by the Wabash Railway Company for authority to establish a fifth major railway system in the eastern part of the United States. With this proposal was coupled a suggestion for a sixth system, which would compete not only with that of the Wabash but with other major railway lines in this district.

In the main plan, permission is requested for acquisition by the Wabash of the following nine roads: Lehigh Valley; Wheeling & Lake Erie; Pittsburgh & West Virginia; Western Maryland; Lehigh & New England; Akron, Canton & Youngstown; Elgin, Joliet & Eastern; Toledo, Peoria & Western; and Chicago & Illinois Midland. The Wabash also desires a one-sixth interest in and joint use of the following: Montour Railroad Company; Monongahela Connecting Railroad Company; Union Railroad Company (Pittsburgh); and the Newburgh & South Shore Railway Company. Also a one-seventh interest and joint use of the Toledo Terminal Railroad Company. Certain other trackage rights are sought.

The suggested sixth system, as outlined in the application, would be made up of the following lines: Delaware, Lackawanna & Western; New York, Chicago & St. Louis (Nickel Plate); Virginian; Buffalo, Rochester & Pittsburgh; Detroit & Toledo Short Line; Lehigh & Hudson; Pittsburgh & Shawmut; Pittsburgh, Shawmut & Northern; Detroit, Toledo & Ironton; and the Montour Railroad. This suggested system would have a total mileage of 4,838 and would touch New York, Chicago, St. Louis and Hampton Roads, Va.

Reclamation Bureau Appoints Three Consultants

Selection of three engineers to act as consultants in the field service of the U. S. Bureau of Reclamation has been announced by the Secretary of the Interior. These are Louis C. Hill, Andrew J. Wiley and William F. Durand. While these men are engaged for general consulting work on all projects of the bureau, it is understood that they will devote special attention to the problems incident to the construction of the Doulder dam.

California Passes Licensing Act

An act providing for the compulsory registration of all civil engineers in the State of California has been signed by Governor Young. The law is to be administered by a board of three civil engineers to be appointed by the Governor. Under the terms of the law applicants for registration shall be at least 25 years old, of good character and shall have been engaged in the practice of civil engineering for at least six years, including one year of responsible charge. Graduation from an engineering school shall count as four years of practice. The application fee is fixed at $15, with an additional fee of $10 for a certificate of registration. For the period of about one year practicing engineers who meet the requirements for registration shall be registered without examination upon the receipt of a $15 fee. The annual renewal charge for registration is $5. Violation of the act carries with it a penalty of a fine of not more than $500 or imprisonment not to exceed three months. Revocation of a certificate requires a two-thirds vote of the board following hearing held by it.

The standards to be required by the board are to be maintained on a parity with similar requirements in other states and countries, and provisions are also made for interchange of registration rights and privileges with other states.

Hartford Asks Bids on Three Kinds of 42-In. Pipe

Bids will be received July 17 by the Water Board of Hartford, Conn., on about 3 miles of 42-in. cement-lined pipe, which may be of cast iron, steel or wholly of concrete, thus giving the same general friction head. C. M. Saville is chief engineer and manager of the board.

Chicago Streets to Be Improved by County Board

To provide a series of paved thoroughfares connecting Chicago's streets with the outlying highway system, a plan has been submitted to the commissioners of Cook County for a five-year program of concrete paving on city streets, utilizing the refund from the new Illinois gasoline tax, which is expected to amount to $3,000,000 annually. Paving projects by the city are subject to numerous delays by legal proceedings and according to the plan proposed by George A. Quinlan, county highway engineer, the county would build a central 20-ft. strip of concrete along the unimproved streets included in the program, leaving the city to complete the paving at the same time or later.

Significant Progress Made by A.W.W.A. at Toronto Convention

New Constitution Adopted—Finance Division Formed—J. J. Hinman the New President

THE 49th annual convention of the American Water Works Association held in Toronto, Ont., June 24-28 was unusually significant in point of business accomplished. A new constitution and bylaws were adopted and, although these must be indorsed by letter ballot, there is no doubt of their passing. A new division of the association was formed to be devoted to water-works accounting and finance, thus rounding out the service of the association to the entire water-works field. Some 50 papers were read and discussed at the various sessions. Registered attendance was approximately 800.

Officers Elected

New officers elected for the ensuing year were: president, Jack J. Hinman, Jr., associate professor of sanitation, University of Iowa, Iowa City; vice-president, George H. Fenkell, general manager, Department of Water Supply, Detroit, and trustees, J. Walter Ackerman, city manager, Watertown, N. Y.; A. F. Porzelius, superintendent, City Water Company, Chattanooga, Tenn.; and W. T. Mayo, commissioners Public Utilities, Shreveport, La. George C. Gensheimer, secretary, Water Commission, Erie, Pa., was re-elected treasurer of the association.

The finance and accounting division elected officers as follows: H. Gordon Calder, Federal Water Service Corporation, New York City, chairman; H. F. Smith, Detroit Water Department, vice-chairman; E. W. Hopkins, Utica, N. Y., and A. M. Bowman of Elmira, Ont., directors. Committees were appointed to cover the following subjects: membership; standard accounting methods; federal taxes; and general methods of water-works financing.

The Presidential Address

The annual address of the retiring president, W. W. Brush, New York City, was devoted chiefly to the new constitution. He also called attention to the new arrangement with the manufacturers whereby they will pay $7,500 per year for the exhibit privilege and will be relieved of all entertainment charges, these coming from a general fund financed by a $5 registration fee for each one in attendance at the conven-

tion. The report of the secretary, B. C. Little, showed a net gain in members for the calendar year 1928 of only fourteen. A budget totaling $57,000 was adopted. The permanent fund of the association now exceeds $14,000.

The committee on water-works practice, Malcolm Pirnie, chairman, reported that work is being directed and committees formed for a supplement to the present Manual of Water Work Practice, rather than for its revision.

The new constitution, which is much simplified and shortened, was drawn up by a committee under the chairmanship of R. L. Dobbin, Peterborough, Ont., and provides for a board of directors representative of all of the sections of the association, also providing representation for the manufacturers and for the committee on water-works practice and publications. Editorial analysis of the new constitution will be found in *Engineering News-Record*, June 13, 1929, p. 935. Abstracts of papers read at the convention will be found in this issue on p. 23.

The Diven Memorial Medal, awarded each year to the individual who has performed the most meritorious and effective service for the association, was presented to James E. Gibson, past-president of the association and manager of the Charleston, S. C., Water Department.

State Dam Control Act Signed by California Governor

State control and supervision over all dams in the State of California through authority vested in the department of public works and administered by the state engineer is provided for in an act recently signed by the Governor. The bill, to a large extent, is a result of public sentiment aroused by the St. Francis dam failure and is designed to include dams built by municipalities, which heretofore had not been subject to any state supervision. Dams owned by public utilities are removed from the jurisdiction of the California Railroad Commission and placed under the control of the state engineer by this act, which is intended to centralize all state control of dam structures. All dams which are 15 ft. high or impound more than 10 acre-ft. of water, either built or to be built, are included within the scope of the bill.

Existing dams are to be studied within the next three years, and either approved or ordered changed to comply with safety requirements. Dams built in the future or alterations made to existing dams which affect their safety must be approved by the state engineer as to plans and specifications before work can be started. Administration of the act is to be carried on under the office of the state engineer except that, upon request of any owner, the department may appoint a consulting board to report on the safety measures involved, the costs of such report to be paid by the owner. The act also provides for supervision over maintenance and operation of all dams, including the taking of any emergency steps necessary to protect life and property.

Civil Service Positions Open

Recent announcements of the U. S. Civil Service Commission list a number of positions in the government service to be filled in the near future. These include: associate civil engineer (flood control), $3,200-$3,700; assistant civil engineer (flood control), $2,600-$3,100; technical editor, $3,500; and junior mathematician, $2,000. Further details may be obtained from the commission at Washington, D. C., or from civil service examiners at the post office or custom house in any city.

Purchase of Alberta Provincial Railways Approved

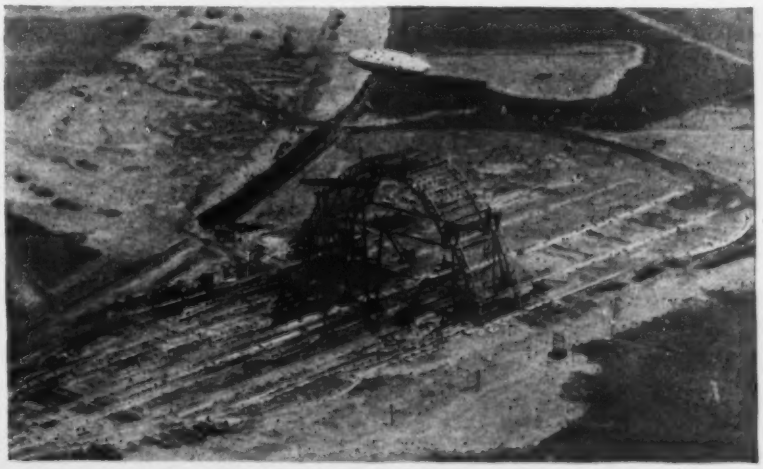
The Canadian Parliament has passed bill authorizing the Canadian National Railway Company and the Canadian Pacific Railway Company to acquire jointly certain railways from the Alberta government at a price of approximately $26,000,000. The bill incorporates the Northern Alberta Railways Company, formed for the purpose of joint control of the acquired lines. These railways, which lead into the Peace River country of northern Alberta, are the Edmonton, Dunvegan & British Columbia Railway; the Central Canada Railway; the Alberta & Great Waterways Railway, with northern terminus on the Athabasca River near McMurray; and the Pembina Valley Railway. The act merely confirms the actual purchase, which was noted in *Engineering News-Record*, Dec. 6, 1928, p. 854.

An interesting feature of the bill is the provision of authority for the Northern Alberta Railways Company to construct four extensions to the existing lines of railway in the Peace River country. These lines aggregate over 500 miles and construction must be started within two years and completed within five years. Three of the lines would open up the country north and south of the Peace River and extending westerly to and into the province of British Columbia. These extensions are from Spirit River westerly 102 miles; from Wembley northwesterly 86 miles and from Whitelaw northerly and westerly on the north side of the Peace River to the British Columbia boundary, approximately 80 miles. The charter rights for the fourth of the proposed rail extensions covers a line extending north clear to the northern boundary of the Province of Alberta, not far short of Great Slave Lake. This line would branch from from the Central Canada Railway at Grimshaw, close to the town of Peace River, extending northerly to Hay River and paralleling the latter to the north boundary of the province, approximately 260 miles.

Bids Asked for First Contract on New Cincinnati Terminals

Construction work on the new Cincinnati union passenger and equipment terminals will be started this summer. Invitations have been extended to a selected list of contractors to submit bids on July 29 for the first contract, consisting of approximately 5,500,000 cu.yd. of filling material. This selected list of contractors was compiled from data secured by H. M. Waite, the chief engineer of the Terminal company, from the results of special questionnaire forms prepared by him and submitted to the contractors. Inasmuch as a surety bond

CONSTRUCTION VIEW OF LARGEST DIRIGIBLE HANGAR



Reproduced above is an air view showing two completed arches of the airship dock and factory being constructed by the Goodyear-Zeppelin Corporation at Akron, Ohio. The two completed arches, which are 80 ft. apart, have a height of 205 ft. and a width of 325 ft. from center to center of arch pins. The completed building will have a length of 1,175 ft. Its design was fully described in *Engineering News-Record*, April 11, 1929, pp. 583-584. The building, the largest of its kind, not only will provide shelter for completed aircraft but will also be used as a dirigible factory, containing shops, storage rooms, offices and drafting room.

will not be required or placed on the contract, the chief factors in determining the qualifications were those representing grading experience, financial and equipment strength.

Each contractor with his proposal will submit to the company a schedule to represent his estimated time and sequence for handling this project. The company's estimated time for doing the work is a maximum of 30 months.

The contractors invited to submit a bid on the grading contract are:

Bates & Rogers Construction Company, Cleveland, Ohio; Ferguson & Edmondson Company, Pittsburgh, Pa.; Foley Brothers, Inc., St. Paul, Minn.; W. H. Gahagan, Inc., Brooklyn, N. Y.; A. Guthrie & Company, Inc., St. Paul, Minn.; Mark R. Hanna Company, Detroit, Mich.; Mason & Hanger Company, Inc., New York, N. Y.; Mellon-Stuart Company, Chicago, Ill; Morris & Dougherty, St. Paul, Minn.; Walsh Construction Company, Indianapolis, Ind.; Winston Brothers Company, Minneapolis, Minn.

Chicago Plans New Roads and an Elevated Street

As a step toward overcoming the serious traffic congestion on roads approaching Chicago, a special committee has been appointed by Governor Emmerson to formulate a program of highway development within a radius of 30 miles from the city. Under the new gasoline-tax law about $19,540,000 will be available for this plan in the next two years, of which $12,300,000 would be spent in Cook County. This committee comprises six engineers, city and county officials, business men and representatives of motor clubs and other organizations. Its chairman is F. F. Winans, president of the Chicago Association of Commerce, and its secretary is Robert Kingery, manager of the Chicago Regional Plan Association. Another step of importance in traffic relief was the signing by the Governor of the bill calling for a referendum vote on a bond issue for $20,000,000 for the construction of an elevated 50-ft. thoroughfare beginning at the Chicago River and extending west about 7½ miles. No street has yet been selected for this structure.

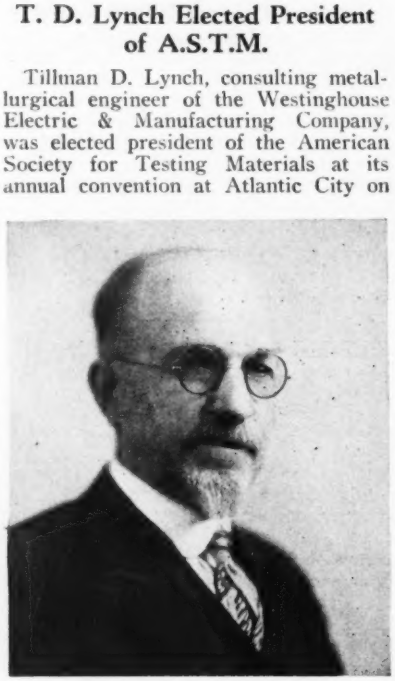
Highway Officials Hold Meeting

The executive committee of the American Association of State Highway Officials met June 3 at Chicago, Ill. Vacancies in the list of officers and in the executive committee were filled as follows: vice-presidents, Stoddard B. Bates, Vermont, Woolsey Finnell, Alabama; member of executive committee, H. G. Shirley, Virginia. Mr. Shirley was also chosen to represent the association on the committee of the International Road Congress to be held in this country in 1930. The resignation of E. F. Kelley as chairman of the committee on bridges and structures was accepted with regret. Albin L. Domeny, senior structural engineer of the U. S. Bureau of Public Roads, was selected to succeed Mr. Kelley.

Upon unanimous vote a resolution was adopted stating that the committee would not consider applications for U. S. route numbering which involve the crossing of privately owned toll bridges, unless the state or political subdivisions thereof were engaged in the process of taking over the bridges with the ultimate object of eliminating tolls. In acting upon a request for the selection of a Pan-American highway through the different states, the committee resolved that it would encourage the connection of numbered U. S. highways with the highways of adjacent countries to the north and south, but that no one route would be selected by the committee to be known as the Pan-American Highway. The next annual meeting of the association will be held at San Antonio, Tex., Nov. 12-15, 1929.

T. D. Lynch Elected President of A.S.T.M.

Tillman D. Lynch, consulting metallurgical engineer of the Westinghouse Electric & Manufacturing Company, was elected president of the American Society for Testing Materials at its annual convention at Atlantic City on June 25. Mr. Lynch has served the society as a vice-president during the last two years and is author of a number of papers presented before the society. He is a civil engineer graduate of the University of West Virginia in the class of 1891 and has been actively engaged in research work since graduation, first as testing and inspecting engineer with G. W. G. Ferris & Company, Pittsburgh, from 1891 to 1897 and then for two years assistant inspector of steel for the U. S. Navy. In 1899 Mr. Lynch went to the Westinghouse Electric & Manufacturing Company and has continued with that company since that date.



Tillman D. Lynch

F. O. Clements, technical director of the research laboratories of the General Motors Corporation, was elected a vice-president of the society to serve two years.

Brief News

FORMAL CEREMONIES incident to the stretching of the first wire of the Hudson River bridge at New York City are scheduled for July 9. The first wire will be for the footbridges, each of which will be supported by two groups of nine 3-in. cables which will later be utilized for suspenders from the four main cables.

A NEW RAPID FILTER PLANT with a capacity of 28 m.g.d. has been completed for the city of Nashville, Tenn., by the Foster & Creighton Company at a cost of $585,952. This is exclusive of the grit chamber, built several years ago at a cost of about $33,000, which is incorporated as a unit in the new plant.

FEDERAL AID to Mississippi in highway construction will automatically stop July 1 except for unexpended balances for the old fiscal year, due to the failure of the legislature of that state to meet fully the requirements of the federal highway act.

FORMS HAVE BEEN DRAWN for the use of Indiana public officials in carrying out provisions of the new law requiring prospective contractors on public construction work to establish their qualifications. The law requires bidders to submit statements of their experience and financial responsibility.

ISSUANCE of $57,500,000 capital stock is announced by the engineering firm of Stone & Webster, Inc., of New York. The number of new shares issued will be 575,000, of which 400,000 will be offered to the public.

A SHORT COURSE in the School of Citizenship and Public Administration of the University of California has been announced for this summer. Included in the program is a five-day series of lectures on sanitary engineering.

DOWNPOUR OF RAIN visited Kansas City on June 22, when there was a precipitation of 3¾ in., of which 3½ in. fell in two hours. Streets were flooded, but very little property damage was done.

FOUNDATION has been completed and concrete poured for the second floor on the Jackson Tower Building, a 23-story office building of solid reinforced-concrete construction at Jackson, Miss. The cost of this building, said to be the tallest all-concrete structure in the country, is estimated at $1,200,000. It is scheduled for completion Oct. 1. The O. N. Gwin Construction Company, of New Orleans, has the general contract.

FOLLOWING VARIOUS CHANGES in the organization of the East Bay Municipal Utility District, Oakland, Calif., the official personnel now consists of the following: chief engineer and general manager, F. W. Hanna; assistant chief engineer and assistant general manager, J. S. Longwell; general superintendent, Mokelumne project, C. E. Grunsky, Jr.; chief designing engineer, R. C. Kennedy; office manager, E. L. Briggs; construction engineer on the distribution system, C. R. Manbert.

New Madrid Landowners Ask Higher Compensation

The U. S. War Department has made inadequate provision for the property owners of southeastern Missouri whose land and flowage rights will be destroyed by the proposed floodway between Bird's Point and New Madrid, Mo., was the answer filed in the United States District Court in St. Louis, Mo., June 24 to the condemnation suits recently filed by attorneys for the government. Drainage District 23 of Mississippi County, one of the defendants, fixed the value of the land to be taken and flowage rights affected by the proposed levee at $15,000,000, or five times the amount the government engineers estimated would be fair compensation.

The answers ask for the immediate dismissal of the condemnation proceedings unless the $15,000,000 is deposited with the clerk of the court in cash or sound securities to compensate the 500 landowners who will be affected.

The government has merely sought a right-of-way for the levee for a distance of 35 miles, but the defendants demand that the War Department be required also to purchase the flowage rights before contracts for the alleged improvement are awarded. The flowage rights are based on the estimated damage that will result when the government is permitted to overflow the present levee near Bird's Point.

Progress on Columbia River Bridge at Longview

With all concrete piers completed, the highway toll bridge across the Columbia River between Rainier, Ore., and Longview, Wash., on June 1 was 42 per cent completed, exactly the percentage programmed in the schedule laid out in advance. Contracts call for the completion of the bridge ready for traffic by Jan. 1, 1930, which means that in the intervening time 12,870 tons of structural steel must be erected and a concrete roadway must be laid on the steel bridge. During 1927 *Engineering News-Record* made reference to this bridge project as follows: March 10, p. 424; March 31, p. 534; June 23, p. 1037; Sept. 15, p. 447.

The bridge will consist chiefly of a 1,200-ft. cantilever span over the channel, flanked by 760-ft. anchor arms. The anchor spans will be erected on falsework and the channel span will be built out as a cantilever from both ends. The steel erection program is laid out to be completed in 157 days from the time of starting. After long debate the clearance above mean lower low water finally decided upon for the channel span is 192½ ft. at the center of the span and 185 ft. at its ends.

During June work progressed rapidly on the timber trestle approaches. The trestle on the Washington side will have a maximum length of 2,615 ft. and where it joins the steel will be 151 ft. above mean lower low water. On the Oregon side the trestle will be 1,792 ft. long with a maximum height of 100 ft.

National Award Announced for the Most Artistic Steel Bridge

As a step in encouraging the building of steel bridges of greater architectural merit the American Institute of Steel Construction has announced an annual national award to be given for the most esthetic solution of a problem in steel bridge construction within the United States or Canada. The first award will be made on a structure completed and opened to traffic during 1928. The jury that will make the award consists of two members selected by the American Institute of Architects, two by the American Socety of Civil Engineers and one by the American Institute of Steel Construction, the personnel of this jury being as follows: William A. Delano, member of the architectural firm of Delano & Aldrich; Ralph T. Walker, member of the architectural firm of Voorhees, Gmelin & Walker; George H. Pegram, chief engineer of the Interborough Rapid Transit Company, New York City; Charles Evan Fowler, consulting engineer, New York City, and Dr. J. Horace McFarland, president of the Art Commission of Pennsylvania. Formal announcement of the jury's selection will be made at the next annual convention of the American Institute of Steel Construction to be held at Biloxi, Miss., in November.

Selection of the prize bridge will be made from photographs, which may be submitted to the bridge award committee, American Institute of Steel Construction, Inc., 200 Madison Ave., New York, N .Y., before Aug. 1, 1929. Accompanying the photograph should be certain essential data such as the engineer, architect, builder, fabricator, erector, owner, etc. The bridge selected will be decorated with a suitable bronze plaque and a diploma will be given to the architect, engineer, builder and owner.

A cash prize also was announced to be given to the engineering and architectural student who offers the most esthetic solution to a theoretical bridge problem. This announcement was also made previously through the Beaux-Arts Institute of Design.

A.A.E. Establishes Welfare Award

Some time during the current year the American Association of Engineers is to make its first presentation of the Clausen Medal, which is to be awarded annually to the person (engineer or otherwise) who performs the most distinguished service during the previous year for the welfare of the engineer—social or economic, or both. H. A. Wagner, a national director of the association, sponsored the movement which authorized the annual award. This year's recipient is to be determined by a committee composed of the following: G. M. Butler, dean and director of engineering, University of Arizona; L. W. Baldwin, president, Missouri Pacific Lines; J. W. Thomas, vice-president, Firestone Tire & Rubber Company; C. F. Kettering, director of research laboratories, General Motors Corporation; Rufus B. von Kleinsmid, president, University of Southern California; Michael J. Pupin, professor, research laboratory, Columbia University; Arthur E. Morgan, president of Antioch College; W. L. Saunders, chairman of the board, Ingersoll-Rand Company; George C. Warren, chairman of the executive committee, Warren Brothers Company; A. N. Talbot, professor emeritus, college of engineering, University of Illinois.

HIGHWAY BRIDGE COMPLETED ACROSS SANDUSKY BAY, OHIO

This concrete and steel bridge 2,035 ft. long and 24 ft. wide crosses Sandusky Bay in Ohio. The improvement, consisting of the bridge itself and 8,376 ft. of earth and stone fill approaches, was completed at a cost of $1,600,000. Harrington, Howard & Ash, Kansas City, Mo., were consulting engineers, and the following were contractors: Mount Vernon Bridge Company, Mount Vernon, Ohio, steel work; O. A. Bently & Sons, Toledo, Ohio, concrete foundations and cofferdams; Great Lakes Dock & Dredge Company, Buffalo, N. Y., earth fill and riprap; Radabaugh-Graham Company, Columbus, Ohio, grading; Homberger & Wager Engineering Company, Sandusky, Ohio, paving and guard rail installation; General Asphalt Company, Akron, Ohio, asphalt work. The bridge was opened to traffic Feb. 2, 1929.

Engineering Societies

CALENDAR

ANNUAL MEETINGS

AMERICAN SOCIETY OF CIVIL ENGINEERS, New York; annual convention, Milwaukee, Wis., July 10-12.

AMERICAN ASSOCIATION OF ENGINEERS, Chicago; annual meeting, Mexico City, Aug. 26-28.

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THE ASPHALT ASSOCIATION and the ASSOCIATION OF ASPHALT PAVING TECHNOLOGISTS will hold the eighth annual Asphalt Paving Conference at West Baden, Ind., Oct. 28-Nov. 1. The improvement of farm-to-market roads will be the keynote of the meeting, and special discussions will be held as to the most economical methods for the construction of low-cost asphalt surfaces on secondary and tributary highways. Other matters to receive attention include airport paving, city street construction and trunk-line highway improvement.

Personal Notes

ALLEN HAZEN and MALCOLM PIRNIE announce the dissolution of the firm of Hazen, Everett & Pirnie, consulting engineers, New York City. Mr. Hazen, Mr. Everett and Mr. Babbitt will continue the firm's business, while Mr. Pirnie will engage in consulting practice under his own name, with offices in New York City.

JOHN H. OWENS, Indianapolis, has been appointed secretary of the newly created Indiana state board of registration for architects. Mr. Owens has served as secretary of the advisory committee of the Indiana Building Council for several years and has held a similar position with the Associated Building Contractors of Indiana.

C. C. GETCHELL has been appointed superintendent of the Bristol and Warren Water Works of Providence, R. I. He has previously spent two years with the Central Main Power Company, eight years with Stone & Webster, Inc., and has recently been in charge of the construction of a pipe line from Lawrence to Bristol, R. I., and the erection of a new water tank at Bristol.

Major VIRGIL L. PETERSON, U. S. Engineers, has been relieved as instructor in the General Service Schools at Fort Leavenworth, Kan. He will report Aug. 20 for duty as assistant to Lieut. Col. U. S. Grant, 3d, director of public buildings and public parks at Washington, D. C.

WALLACE LAWRENCE, formerly of Salem, Va., has been made city manager of Alexandria, Va. He will assume his duties Aug. 1. Mr. Lawrence is vice-president of the Virginia League of Municipalities and a member of the American Association of Engineers and the International City Managers Association.

HARRY REINHARDT, for a number of years assistant to George Wilhelm, general manager of the East Bay Water Company, Oakland, Calif., which last year was acquired by the East Bay Municipal Utility District, now is associated with Loveland Engineers, Inc., San Francisco.

Major-Gen. HARRY TAYLOR, former Chief of Engineers, is en route to the British Isles, where he expects to spend several months on a recreation trip.

JOHN C. SIEGEL, for many years superintendent of the West Construction Company, Baltimore, and more recently engaged in the construction business himself, has been appointed director of the division of maintenance and operation of public school buildings in Baltimore. He fills a vacancy caused by the recent resignation of ABRAHAM TOBIAS.

R. K. BROWN, formerly superintendent and chief engineer, Salt Lake & Utah Railroad, is now superintendent of construction for the Utah Building Commission, recently created by the state legislature.

GEORGE W. WELSH has been appointed city manager at Grand Rapids, Mich., succeeding FRED H. LOCKE, who has resigned.

H. L. SHAW has been appointed city engineer of Houston, Tex. For many years Mr. Shaw has been in charge of construction work in Texas, California and Mexico.

HENRIQUE G. ARANGO and EMANUEL LYONS, JR., engineers, and ROLLAND C. BUCKLEY, architect, have formed a partnership for the practice of architecture and engineering under the name of Buckley, Arango & Lyons, with offices at Panama, Republic of Panama.

WALLACE W. TAGGART has resigned from the Kentucky State Highway Department to accept a position with the Union Terminal Company of Cincinnati.

L. C. CARTER, bridge designer for the Kentucky State Highway Department, is now connected with the Louisville Bridge & Iron Works, of Louisville, Ky.

HARVEY STANLEY has resigned as bridge designer for the Kentucky State Highway Department to become connected with the U. S. Army at Philadelphia, Pa.

ARTHUR J. RHODES has been appointed city engineer of Manhattan, Kan., taking the position made vacant by the death of F. A. Korsmier in February, 1929. Mr. Rhodes was formerly city engineer of Manhattan for five years, and later Riley County engineer for six years, and for the past two years has been in the bridge contracting business.

ARTHUR P. MELTON, of Gary, Ind., a civil engineer, has been appointed a member of the state highway commission. Mr. Melton served three years on the state board of registration for professional engineers and land surveyors, his term expiring last year. He also served on the Calumet ditch commission. Mr. Melton designed the new town of Gary and has served that municipality as city engineer, member of the board of school commissioners and city comptroller.

Obituary

CARLTON R. DART, bridge and structural engineer for the Sanitary District of Chicago from 1901 to 1921, died at his home in Wilmette, Ill., on June 23. Mr. Dart was born at Lansing, Mich., in 1862 and graduated from the Michigan Agricultural College in 1881, taking a post-graduate course at the University of Michigan in 1882-83. After a short experience in the city engineer's office at Lansing, he entered railroad employ and from 1886 to 1891 was assistant engineer on the Union Pacific Railroad. For the next two years he was a structural designer for the Chicago Columbian Exhibition, and then worked with different firms, including the American Bridge Company, until 1901. Since leaving the Sanitary District in 1921 he had been engaged in private practice. Mr. Dart was a member of the American Society of Civil Engineers and the Western Society of Engineers.

JAMES A. BELL, prominent Canadian engineer, died at his home at St. Thomas, Ont., on June 26, in his 78th year. Mr. Bell had resided in St. Thomas for the past 53 years. From 1882 to the time of his death he was municipal engineer for the county of Elgin and during the years 1882-91 and again from 1896 to 1911 he was city engineer of St. Thomas. In 1881 he constructed the cantilever bridge over Niagara Falls for the Michigan Central Railway and supervised construction of part of that railway system. He also superintended construction of waterworks in various Ontario towns.

CHARLES E. BOLLING, for 60 years an official of Richmond, Va., died in that city on June 23. He was superintendent of water-works under Richmond's old form of government, and was the city's first director of public works. At the time of his death he had charge of the James River survey as consulting engineer for the city.

WILLIAM O. WINSTON, JR., vice-president of Winston Brothers Company, general contractors, and who was the engineer in charge of the work on the Skagit project, died in Seattle, Wash., on June 19. He was 40 years old.

GEORGE PAUL DUSSAU, 73, structural engineer who supervised the setting up of the Bartholdi Statue of Liberty in New York harbor in 1883, died in Berkeley, Calif., June 19. He was a native of France.

Construction Equipment and Materials

Water-Works Manufacturers Make New Exhibit Ruling

At the recent Toronto meeting of the A.W.W.A. the Water Works Manufacturers Association decided by a large majority vote to exhibit only at conventions approved by its executive committee. Approved conventions, it is understood, will include the annual meetings of the American Water Works Association, the New England Water Works Association and the Southwest Water Works Association.

The following new members were added to the executive committee: Mathieson Alkali Works, Neptune Meter Company, Hersey Manufacturing Company, R. D. Wood & Company and the East Jersey Pipe Company. New officers of the executive committee are: president, W. C. Sherwood, Hersey Manufacturing Company; vice-president, H. Seaver-Jones, East Jersey Pipe Company. E. J. Buttenhelm, of *The American City*, and J. A. Kienle, of the Mathieson Alkali Works, were continued as treasurer and secretary, respectively.

Adopt Core Drill Standards

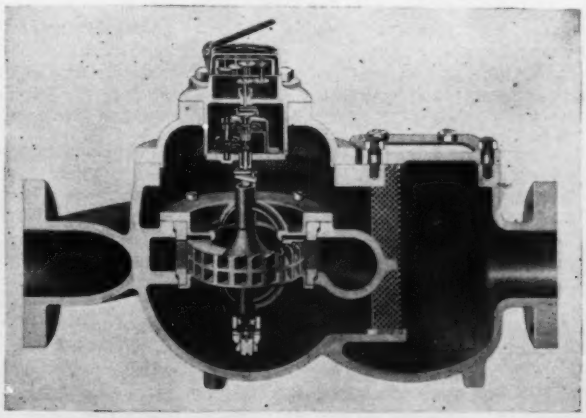
As the result of a general conference of representatives, manufacturers, drilling contractors and other interests held in Chicago, Ill., May 27, the Bureau of Standards of the U. S. Department of Commerce is circulating for approval a recommended commercial standard for diamond core drill fittings.

New Developments

Turbine Water Meter Improved

Requirements of both the American and New England water works association specifications are met by the improved Worthington cold-water turbine meter, a sectional view of which is shown. The hard rubber, covered, balanced turbine wheel and volute pattern discharge, which has a section area at all points equal to the volume of discharge, registers through a three-gear train of Monel metal inclosed so that it may be run in oil. Each gear has a long Monel metal spindle which revolves in two rubber bushed bearings. The wheel itself runs on an agate ball jewel bearing which offers minimum resistance to turning and is covered on both sides to secure accuracy on small flows. By removing the holding screws the turbine, the upper and lower center bearings and the bearing ring may be taken out in a single piece for repair. The meter will pass water uninterruptedly while such repairs are being completed.

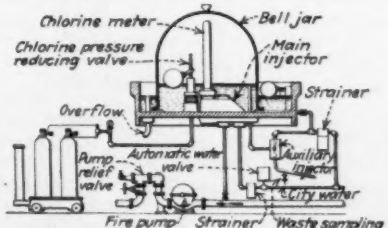
Sizes available vary from 10 to 6,400 g.p.m. The limits of capacity as specified are maintained at flows which insure long life and prevent damage.



New Water-Treatment Devices Announced

Three forms of apparatus for use in the purification of water have been developed by the Wallace & Tierman Company, Inc., Newark, N. J. These include a fire pump chlorinator, a chemical feeder and a main sterilizer or portable chlorinator.

The fire pump chlorinator has been developed with the aid of representatives of the fire underwriters and of the New York State Department of Health for use in industrial plants where it is absolutely necessary to maintain a cross-connection between a public water supply system and an auxiliary fire system. Installation in conjunction with a Factory Mutual type double check valve is recommended, and the chlorinator is not sold except under approved conditions by the state Board of Health. The chlorinator uses the standard W. & T. vacuum type solution feed equipment. A small auxiliary injector is provided which is operated continuously from the city water system, wasting from one to two pounds of chlorine solution per day. Operation at this low rate keeps the chlorinator ready for emergency use when the fire pump is put in operation. Water from the fire system, when operated, supplies the main injector of the chlorinator and automatically feeds chlorine to the fire pump supply at a predetermined rate to assure sterilization. Over 70 installations of this machine are now in operation at industrial plants in New York State.

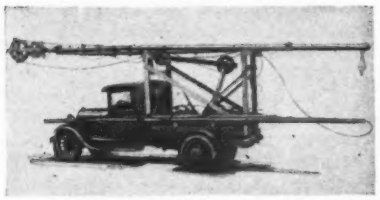


The dry chemical feeder, known as type O, has an unusually wide operating range and may be used for either fine or relatively coarse chemicals at rates varying from 0.1 to 80 lb. per hour, depending somewhat on the chemical handled. The chemical is contained in a hopper, the sides of which are flexed by means of levers near the top which alternately pull in and push out, preventing arching of the contents. A vertical agitator is also provided. The discharge from the oscillating spout is in the form of a ribbon, the rate of discharge being determined by the length of ribbon pushed off the feed plate at each stroke of the spout. This rate is regulated by a hand wheel having a 100-division circular scale, making adjustment easy and accurate. In addition to the spout stroke adjustment, the cross-section of the chemical ribbon may be varied. Power is supplied by a ⅛-hp. motor operating through gears immersed in oil. The apparatus is applicable for either direct or solution discharge; for the latter a circular solution pot is provided.

Portable chlorinating equipment for the sterilization of water mains and for other purposes is compactly arranged in two wooden cabinets with a carrying handle on each. All fittings and accessories needed to chlorinate by either the direct or the solution method, and for making residual tests for control purposes, is supplied. One cabinet contains the chlorinator; the other the accessories and testing equipment.

Portable Drilling Outfit for Foundation Testing

A lightweight drilling outfit designed to handle water wells and foundation testing for buildings and bridges has been developed by the Star Drilling Machine Company, Akron, Ohio, and designated as the No. 40 Speed-Star. In the accompanying illustration it is shown mounted on a Ford truck, from which it may be removed easily, leaving the truck free for other purposes. The weight of the outfit without the truck is approximately 3,400 lb., making the gross weight about 3 tons. It is claimed that one man can rig up the machine. The mast is raised by engine power and the tools can be carried assembled on



the side of the machine when moving. In drilling, the high gear of the truck is used and the slow speeds are available for fishing, pulling pipes, etc. With a lightweight, shock-absorbing spudder, wire line can be used exclusively for drilling. Pulleys with combination grooves permit the use of either wire or Manila cable.

Tractor-Mounted Air Compressor

A new development in combination machines is announced by Metalweld, Inc., Philadelphia, Pa., in the form of a tractor-mounted air compressor. Tractors manufactured by the Cleveland Tractor Company, Cleveland, Ohio, are

used in combination with four sizes of the Metalweld-Worthington "Air King" compressor built for this service. These compressors vary from 105 to 256 cu.ft. displacement and each is direct-connected to the rear power take-off shaft of the tractor by means of a flexible steel coupling.

New Publications

Concrete Bridges—PORTLAND CEMENT ASSOCIATION, Chicago, Ill., has prepared an illustrated booklet on concrete bridges for distribution to engineers, town councils and chambers of commerce where bridge construction is under consideration. Included in the 32 pages are articles in non-technical language on the principles of structural design, the fundamentals of concrete, bridge beauty and the history of bridges. A large number of illustrations show typical concrete bridges from all sections of the United States.

Concrete Reinforcement—CONCRETE STEEL COMPANY, 42 Broadway, New York City, has published "Modern Concrete Reinforcement," a practical manual on the methods and materials used in placing, supporting, spacing and holding steel reinforcement in concrete structures. This contains detailed step-by-step diagrams showing the sequence used in placing steel in various classes of concrete construction. The 32-p. illustrated booklet describes Havemeyer reinforcement, materials, methods and service, including supporting, spacing and holding devices. The information is based upon the specifications for placing reinforcement of the Concrete Reinforcing Steel Institute. The company is also issuing data sheets which contain condensed directions for setting reinforcement in columns, beams and slabs (Sheet No. 1), and in two- and four-way flat slabs (Sheet No. 2).

Hangar Construction—H. H. ROBERTSON COMPANY, Pittsburgh, Pa., has assembled a set of folders dealing with various aspects of airplane hangar construction. The five sections take up the topics of engineering, including standardized design and ventilation; government experience as a guide in airport construction; obsolesence and its effect upon hangar design; costs and their reduction; and daylighting and its effect upon the utility of a hangar.

Cranes—AMERICAN HOIST & DERRICK COMPANY, St. Paul, Minn., has issued an 8-p. booklet describing the American gasoline crane with three-speed automotive type transmission.

Reinforcing Mesh — CONSOLIDATED EXPANDED METAL COMPANIES, Wheeling, W. Va., has published a 4-p. folder suggesting briefly the methods to be followed in obtaining satisfactory results from concrete floors laid directly on the ground surface.

Road Machinery—AUSTIN-WESTERN ROAD MACHINERY COMPANY, Chicago, Ill., has issued two bulletins describing, respectively, the Austin Cadet, a pup roller made in 5-, 6- and 7-ton sizes, and the Austin Mammoth Senior 12-ft. leaning wheel grader with two piece telescopic rear axle and disk wheels.

Concrete Placing Equipment and Pumps—JAEGER MACHINE COMPANY, Columbus, Ohio, has issued two bulletins describing contractors' equipment. Material towers and concrete chuting and placing equipment are described in bulletin JT-101. Bulletin P-29 describes contractors' pumps of the diaphragm, plunger and centrifugal types.

Floor Forms—NATIONAL CONCRETE METAL FORMS CORPORATION, Newark, N. J., has published a new catalog on the D & R system of removable metal forms for concrete flooring. Many drawings are included, showing the application of the system, and typical specifications and estimating tables are given.

Diesel Engines — CHICAGO PNEUMATIC TOOL COMPANY, New York City, describes in bulletin 775 the type RH-75 diesel engine. This is of the vertical, four-cycle, high-compression, solid injection type, furnished in cylinder combinations of three, four and six cylinders developing from 225 to 450 hp. at 257 r.p.m. Besides a detailed illustrated description of the engine, part by part, the bulletin includes a chart showing cost of fuel per hour for different sizes of engines operating at various loads.

Business Notes

CERTAIN-TEED PRODUCTS CORPORATION, St. Louis, Mo., through an associated Georgia company, is planning to erect an asphalt roofing plant at Savannah, Ga., to produce smooth and slate surface roofing and miscellaneous products. The new plant will have a capacity of 1,360,000 squares of asphalt roofing per year, and will cost about $600,000. Fifty acres of land has been acquired, providing space for future additions when necessary.

FUSION WELDING CORPORATION, Chicago, Ill., a subsidiary of the Chicago Steel & Wire Company, has taken over the sale of all welding rod manufactured by the parent company.

WESTERN CANADA STRUCTURAL STEEL & BRIDGE COMPANY, LTD., Vancouver, B. C., announces the election of Victor Spencer as president and L. Laird Gordon as vice-president.

CHAIN BELT COMPANY, Milwaukee, Wis., has transferred R. T. Steindorft, assistant to W. B. Marshall, conveyor sales manager, from Milwaukee to Cleveland, Ohio.

PARADON MANUFACTURING COMPANY, Arlington, N. J., has appointed L. E. Layne, Chicago, Ill., its factory representative for Illinois, Indiana and southern Wisconsin.

FAFNIR BEARING COMPANY, New Britain, Conn., has entered the railway equipment field through the purchase of the Railway Motors Corporation of De Pere, Wis., manufacturer of the Melcher roller bearing for journal applications. The product will be known as the Fafnir-Melcher roller journal bearing.

JOSEPH T. RYERSON & SON, INC., Chicago, Ill., has made a number of executive changes. A. M. Mueller, formerly general manager of sales, is now assistant secretary and a member of the board of directors. He is succeeded in the post of general manager of sales by H. B. Ressler. Robert C. Ross is advanced from general traffic manager to assistant to the president, in charge of plant operations. William H. Bryant, formerly assistant manager of sales at Chicago, becomes Chicago sales manager. Guy H. Rumpf, formerly manager of plant operations, becomes manager of the St. Louis plant. Harry W. Treleaven has been elected assistant treasurer.

TRUSCON STEEL COMPANY, Youngstown, Ohio, announces that H. B. Miller, who has been manager of its Pittsburgh office, has been appointed general manager of the Pacific Coast plant in Los Angeles, Calif., and will also supervise the Truscon branch offices in Seattle, Portland, San Francisco and Los Angeles. Mr. Miller has been made a vice-president of the company. He will be succeeded at Pittsburgh by W. H. Kelley, formerly connected with the branch office in Chicago.

The Business Side of Construction

Industry as Active in First Half as in 1928

Bank debits in the first half of the year total some 450 billions, compared with 399 in that period of 1928. This increased money turnover of 13 per cent gives the measure of business activity this year. This activity has by no means been confined to exploitation, but has been largely shared by productive industry.

More electric energy has been used and paid for. Both generation and revenue are some 10 per cent above last year. The coal industry is more than able to supply any industrial needs. Bituminous production is up to 10 per cent in direct response to the much increased demand. Machine-tool builders are reported slightly apathetic toward new orders because of the volume of those already booked. The chemical industry reports increased employment and record earnings due to larger turnover rather than to increased margin of profit. Among the more recent additions to industry, aviation appears to be as active as any. The list of last year's aircraft manufacturing companies brought to date shows many deletions and additions. As is to be expected, consolidations are numerous. The main thing in this industry is not production in quantity but building a background of financial and vital safety. This year's production is estimated at 6,500 aircraft, compared with 3,346 last year.

Total construction this year is within 1 per cent of the 1928 value and in absolute volume identical. Engineering construction is up 26 per cent, residential building down 28 per cent. The engineering construction gain has been entirely in private work, public construction being almost exactly the same in value as in the first half of 1928. The values of water-works, sewers and bridges compare closely with those of last year. Roads and streets, the backward factor in construction this year, have climbed to within 23 per cent of last year's figure of $333,000,000. June road contracts exceeded those of a year ago by 9 per cent, and it is quite possible that the deficiency will be made up by the end of the summer. Federal government work is twice as heavy as a year ago.

All classes of heavy buildings are ahead of last year's contract figures, the largest gain being in the industrial division, where $311,000,000 has been spent, compared with $146,000,000 a year ago. Commercial buildings are 14 per cent ahead, public 51 per cent. Small residential buildings, the backward class in private work this year, have been rising since May 1 and are now only 28 per cent under last year's figure. Unclassified structures show the tremendous gain of 131 per cent.

These gains in engineering construction are widely spread. Only in the Middle West was there a decline, and this was only 2 per cent. The smallest gain was in New England, and amounted to 4 per cent. Increases west of the Mississippi were substantial, as was also the margin in the Middle Atlantic states.

Corporate securities issued in May totaled $923,000,000, compared with $594,000,000 the year before. These were discussed in some detail in the issue of June 20, p. 1014.

Prices Lower on Materials for Small Structures

Most of the chief materials except steel are at lower price levels than a month ago. Lumber, cement, brick and lime are down in important centers, while steel shapes, reinforcing bars and metal lath are above the prices of a month or a year ago.

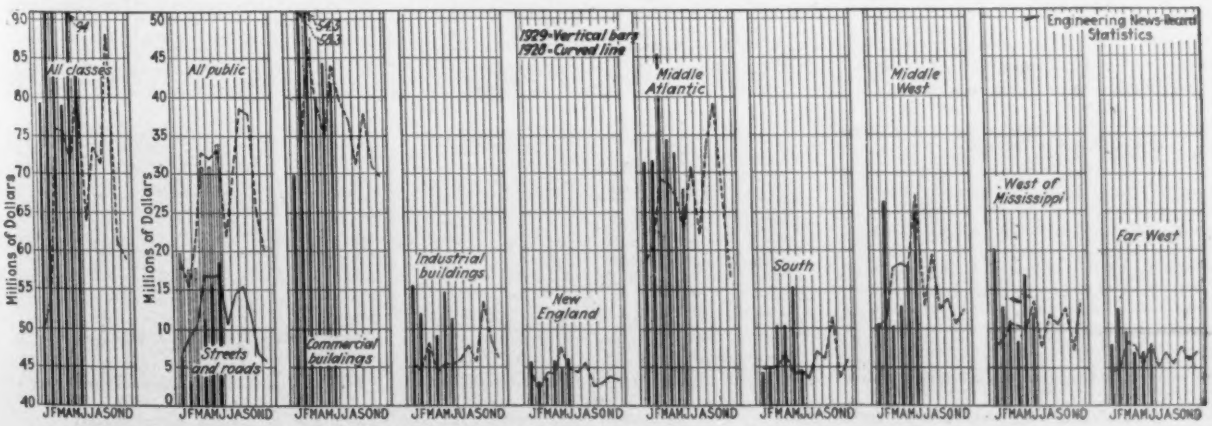
Steel Prices Hold for Third Quarter—Both price and demand are strong, with $1.95 Pittsburgh applying on all current transactions for third quarter delivery. Small quantity mill lots will probably bring $2 per 100 lb. for this quarter. Reinforcing bar sales are in fair volume and tank plates continue to move in substantial quantities. Fabricated structural steel sales are 24 per cent ahead of last year to date.

Prices of shapes and plates are 10c. above those of June, 1928, which were

VALUE OF CONTRACTS BY SECTIONS IN THE UNITED STATES AND TOTAL FOR CANADA, JUNE, 1929
Thousands of Dollars (000 omitted)

	New England	Middle Atlantic	South	Middle West	West of Mississippi	Far West	United States June, 1929	United States Year to Date 1929	United States Year to Date 1928	Canada June, 1929
Water-works	$329	$602	$160	$2,693	$868	$112	$4,764	$23,559	$28,803	$727
Sewers	120	2,524	1,925	2,437	925	614	8,545	45,011	51,406	2,981
Bridges	382	2,679	1,283	2,701	1,956	454	9,455	70,288	68,913	1,703
Excavations, etc.	77	554	37	1,458	47	48	2,221	18,242	15,309	272
Streets and roads	3,628	22,574	5,231	12,050	21,674	8,247	73,404	256,866	332,523	3,431
Industrial buildings	1,625	11,417	2,070	18,398	4,264	7,430	45,204	310,776	146,294	1,215
Commercial buildings	17,047	65,481	6,534	57,754	10,486	9,670	166,972	1 147,020	968,726	4,365
Federal government	232	3,271	730	1,059	344	722	6,358	51,038	24,801	.....
Unclassified	704	2,172	439	484	7,424	2,019	13,242	217,125	137,161	7,330
June, 1929*	24,144	111,274	18,409	99,034	47,988	29,316	330,165	.....	.....	22,024
May, 1929†	25,054	161,695	75,562	90,251	84,773	34,274	471,609	.....	.....	16,192
June, 1928*	19,316	91,129	17,565	109,171	54,088	32,085	323,354	.....	.....	12,496
Year to date, 1929	126,762	875,325	216,993	438,850	362,077	219,918	.....	2,239,925	.....	94,298
Year to date, 1928	121,787	643,636	127,294	448,062	265,257	167,900	.....	.....	1,773,936	76,547

*Four weeks. † Five weeks.



CONTRACTS AWARDED—AVERAGE WEEK PER MONTH—TOTAL U. S. BY CLASSES—ALL CLASSES BY SECTIONS

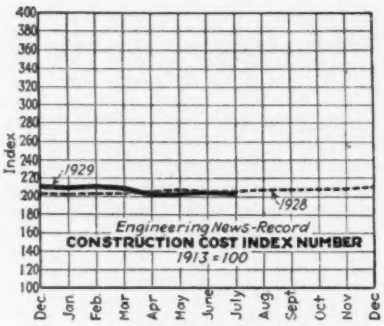
$1.85 and $1.95, respectively. Expanded metal lath prices advanced at all principal centers during June, as a consequence of more costly steel. Automotive demand more than any other single factor caused scarcity of sheet stock used in making lath.

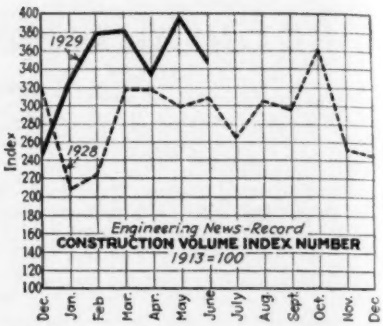
New Steel Freight Rates—The Interstate Commerce Commission has prescribed a mileage scale of what it terms reasonable freight rates on iron and steel shipments east of the Mississippi and north of the Ohio and Potomac rivers, where steel production is 90 per cent of the total for the country. The commission's order follows a general investigation of freight rates in response to a Congressional resolution.

Lower rates will reduce railroad revenues by $2,500,000, according to an estimate by Thomas F. Woodlock, a member of the commission. Following is the basic scale, per 100 lb.: 5 miles and under, 6c.; 100 miles, 16c.; 200 miles, 21½c.; 300 miles 26½c.; 400 miles, 31c.; 500 miles, 35c.; 600 miles, 38c.; 700 miles, 41c.; 800 miles, 44c.; 900 miles, 47c.; 1,000 miles, 50c.; 1,100 miles, 53c.; 1,200 miles, 56c. This schedule is expected to become effective by Oct. 20.

Lumber Demand Slower—The lumber business is slower than a year ago. A total of 1,906 mill reports received by the National Lumber Manufacturers Association from identical establishments for the five weeks ended June 15 show demand to have receded 13 per cent, shipments to jobbers and dealers 8 per cent, and production 4 per cent, with stocks 10 per cent lighter than a year ago. The most favorable factor from the lumber merchants' standpoint is the reduced stocks. In the Minneapolis district, particularly, yard stocks are badly broken.

In the Pacific Northwest demand is running 10 per cent ahead of production, a situation highly favorable to the manufacturers. Leading jobbers believe that reduced freight rates will lower prices of fir from 5 to 10 per cent in the next two months. It is expected that the present water freight rate of $14 will drop to $11, but not lower. Jobbers foresee a price decline for hemlock and other species for the summer months, though less marked than for fir.





ENGINEERING NEWS-RECORD CONSTRUCTION COST AND VOLUME INDEX NUMBERS

Construction Cost and Volume Index Numbers

E. N.-R. Cost		E. N.-R. Volume*	
July, 1929	**204.77**	**June, 1929**	**347**
June, 1929	205.65	May, 1929	395
July, 1928	206.65	June, 1928	308
Peak June, 1920	273.80	1928 (average)	287
1928 (average)	206.78	1927 (average)	263
1913 (average)	100.00		
1928		**1928**	
January	203.90	January	208
February	204.65	February	225
March	204.65	March	318
April	206.40	April	316
May	207.00	May	299
June	206.15	June	308
July	206.65	July	266
August	207.29	August	306
September	207.29	September	296
October	207.71	October	363
November	209.46	November	251
December	210.16	December	244
1929		**1929**	
January	209.40	January	325
February	210.40	February	378
March	207.78	March	382
April	203.40	April	332
May	205.15	May	395
June	205.65	June	347

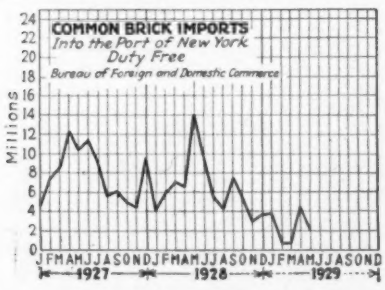
*Corrected for price change since 1913.

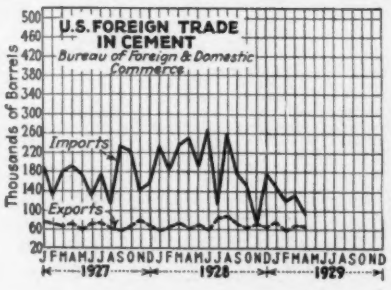
Sectionally, production is ahead of selling by the following percentages: Western pine, 10; Southern pine, 15; North Carolina pine, 20; Northern pine, 25; Northern hemlock, 25; California pine, 45 per cent.

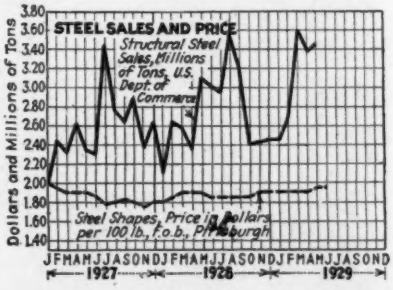
Cement Price War in South—Cement sales are reported by leading manufacturers as fairly active in the East and below normal in the West. Boston and Atlanta are the weakest markets. In Boston the lower priced Belgian cement is offering severe competition with resulting loss of sales. Atlanta has a dealers' war. During the month cement was cut 15c. ($2.10 net), and drastic price reductions were made for sand, gravel, crushed stone, tile, brick, sewer pipe and lime.

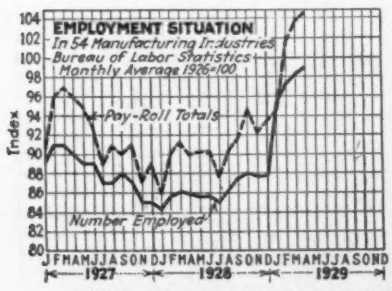
This year's cement business is similar to that of last year in that dealers delayed active buying until after April. In 1927 dealers stocked heavily early in the first quarter.

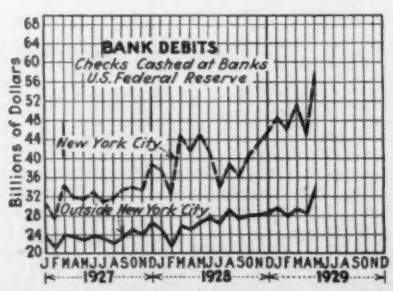
Shipments, considered the indicator of the cement trade, are estimated at 16,222,000 bbl. for June, or 12 per cent under those of last year. Production is 6 per cent under. Slackened demand has piled up mill stocks until they are 14 per cent greater than those of last year.

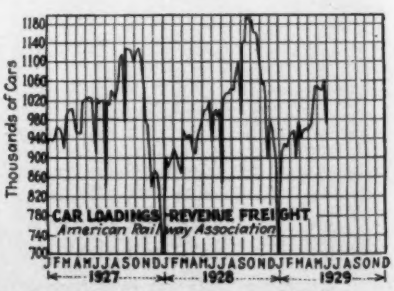

COMMON BRICK IMPORTS
Into the Port of New York
Duty Free
Bureau of Foreign and Domestic Commerce
Millions
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1927 1928 1929


U.S. FOREIGN TRADE IN CEMENT
Bureau of Foreign & Domestic Commerce
Thousands of Barrels
Imports
Exports
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1927 1928 1929


STEEL SALES AND PRICE
Structural Steel Sales, Millions of Tons, U.S. Dept. of Commerce
Steel Shapes, Price in Dollars per 100 lb., f.o.b., Pittsburgh
Dollars and Millions of Tons
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1927 1928 1929


EMPLOYMENT SITUATION
In 54 Manufacturing Industries
Bureau of Labor Statistics
Monthly Average 1926=100
Pay-Roll Totals
Number Employed
Index
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1927 1928 1929


BANK DEBITS
Checks Cashed at Banks
U.S. Federal Reserve
New York City
Outside New York City
Billions of Dollars
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1927 1928 1929


CAR LOADINGS—REVENUE FREIGHT
American Railway Association
Thousands of Cars
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1927 1928 1929

BRICK IMPORTS—CEMENT IMPORTS AND EXPORTS—STEEL DEMAND—RELATION OF NUMBER EMPLOYED TO TOTAL PAYROLL—CHECK PAYMENTS—FREIGHT MOVEMENT

CURRENT BUILDING AND CONSTRUCTION TRADES WAGE RATES PER HOUR

Advances since last month are indicated by **heavy type**; declines by *italics*

Cities	Bricklayers	Carpenters	Hoisting Engineers	Hod Carriers	Pile Drivers	Structural Iron Workers	Common Labor*
Atlanta	$1.25@1.40	$0.60@ .70	$0.60@1.00	$0.50	.....	$0.75@1.25	$0.25@.35
Baltimore	1.62½	1.00@1.10	1.00@1.37½	1.00	$0.65	1.00@1.25	.35
Birmingham	1.50	1.00	1.25	.50	.....	1.75	.15@.30
Boston	1.50	1.37½	1.37½	.85	1.27½	1.37½	.45@.80
Cincinnati	1.62½	1.37½	1.37½	.97½	1.37½	1.37½	.40@.60
Chicago	1.62½	1.56¼	1.56¼	.90	1.56¼	**1.62½**	82½@.90
Cleveland	1.62½	1.37½	1.37½	.87½	1.10	1.50	.40@.87½
Dallas	1.67½	1.12½	1.25	.50 @ .75	1.25	1.25	.35 @.50
Denver	1.50@1.62½	1.25	1.25@1.37½	.87½@1.00	.....	1.25	.37½@.62½
Detroit	1.56¼	1.00@1.25	1.00@1.10	.90	1.00@1.10	1.00@1.25	.37½@.60
Kansas City	1.50	1.25	1.25	.90	1.25	1.25	.30@.75
Los Angeles	1.25	1.00	1.00	.87½	.....	1.00	.50
Minneapolis	1.25@1.37½	.87½@.95	.87½	.75	.....	1.00	.40@.60
Montreal	1.25	.80	.75	.40	.....	1.00	.30@.35
New Orleans	1.50	.90	1.25	.75	.80@1.00	1.25	.30@.40
New York	1.87½	1.50	1.75	1.12½	1.00@1.12½	1.75	.90½
Philadelphia	1.62½	1.12½@1.25	1.02½	.70@1.12½	1.00	1.37½@1.50	.45@.50
Pittsburgh	1.70	1.50	1.43¾@1.56¼	1.12½	.....	1.50	.40@.80
St. Louis	1.75	1.50	1.50	1.15@1.25	1.25	**1.62½**	.40@.75
San Francisco	1.37½	1.12½	1.12½	.87½	1.12½	1.37½	.50@.60
Seattle	1.50	1.12½	1.25	1.00	1.12½	1.25	.70

*Minimum rates are for construction other than buildings, non-union.

More Wages, Not Five Days, Labor's Principal Urge

Strong as is the movement for a five-day week in the building industry, a number of wage agreements omitting mention of this feature were signed in June. In four cities wage advances were accompanied by the five-day clause, and in five cities were not. All settlements were in favor of the unions, seven of the nine being won by strikes.

In Boston, Newark, Philadelphia and Washington the five-day week with wage advances were won by electricians, carpenters, plasterers and plumbers, respectively. Wage advances without the five-day week were granted the following crafts: ironworkers, Chicago; carpenters, Sioux City; electricians and plumbers, Davenport; ironworkers, plumbers' helpers and common laborers, St. Louis. Plasterers in Indianapolis received the five-day week with no wage increase. Local conditions are reported below:

Boston—Expected increase in building not materialized, despite nearness of midsummer. Many building-trades mechanics walking streets. Electricians to receive wage advance and five-day week beginning Aug. 1.

New York—At first of a series of hearings before the arbitration board in the local building trades dispute, the employers withdrew formally on the ground that an agreement with the unions to arbitrate all claims had not been legally signed. Justice Crain denied the right of the employers to withdraw. (For details of this dispute see *Engineering News-Record*, June 13, 1929, p. 974.) Insistence of employers that proceedings be under state arbitration law may throw whole matter back to status of May 20, when a complete tie-up of construction was threatened.

Newark—Five-day week with wage advances granted local store-fixture carpenters and millmen. Shorter week effective July 1, wage increases (7½c. to 15c.) effective Oct. 1.

Philadelphia—Plasterers won strike started early in June for the five-day week with increase to $1.25 per hour and time and a half for overtime and double time for holidays.

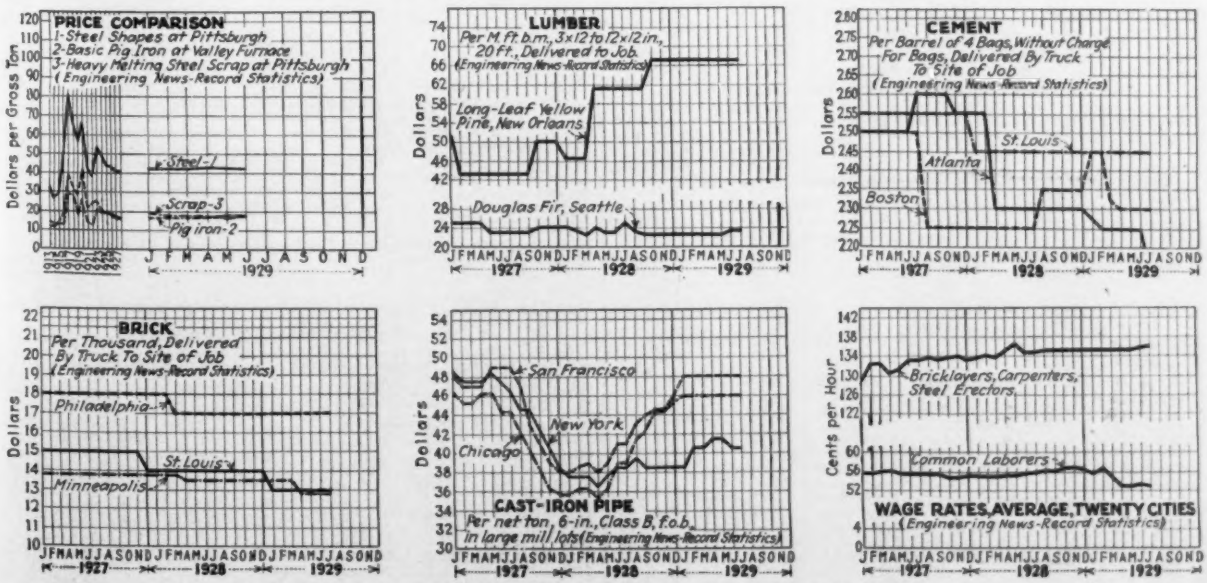
Chicago—Ironworkers, structural and architectural, won strike started during June. Structural men receive advance of $1 per day ($13), agreement to expire June 1, 1930. The architectural workers receive 10c. to $1.60 until Oct. 1, thereafter $1.62½. Millwork carpenters accept present scale of $1.20 for next two years. All crafts preparing to demand five-day week to alleviate local unemployment. Employers object on grounds of cost.

Indianapolis—Five-day week without increase won by union plasterers after strike lasting two weeks.

St. Louis—Strike of structural ironworkers, started May 1, ended June 21 with compromise whereby wages will be increased $1 ($13), this to hold until 1931. Strike of plumbers' helpers settled June 12, when union and masters agreed that the scale be raised 25c. per day ($7.75) immediately, with $8 per day Aug. 1. Union building laborers, on strike since May 1, returned June 8 under an agreement granting 12½c. (87½c.) effective Aug. 1. Men had demanded 90c. per hour. Stonecutters, who also went on strike May 1, returned at old rate.

Wage changes are upward in skilled trades and downward in common labor. The average skilled rate is $1.36¼ per hour, compared with $1.35⅜ a month ago and $1.34⅜ in July, 1928. The average rate for skilled labor in manufacturing is 66.7c. per hour.

The national rate for common labor is 52.96c. per hour, as against 53.4c. a month ago and 55.75c. in July, 1928. The average common labor rate in manufacturing is 50.3c. per hour.



PRICES OF CONSTRUCTION MATERIALS AND WAGES OF LABOR

Current Prices of Construction Materials

Price advances since last month are indicated by **heavy type**; declines by *italics*

Building Materials

PORTLAND CEMENT—Prices per bbl., quoted by manufacturers and dealers, delivered by truck to contractors, *without charge for bags*. Cash discount not deducted.

	July 4, 1929	One Month Ago	One Year Ago
Atlanta	*$2.10*	$2.25	$2.40
Baltimore	2.65	2.65	2.65
Birmingham	2.60	2.60	2.60
Boston	2.25@2.35	2.25@2.35	2.35
Cedar Rapids (f. o. b.)	2.24	2.24	2.24
Chicago (f. o. b.)	2.05	2.05	2.05
Cincinnati (f. o. b.)	2.17	2.17	2.22
Cleveland (f. o. b.)	2.14	2.14	2.24
Dallas	2.15	2.15	2.40
Davenport (f. o. b.)	2.24	2.24	2.24
Denver	2.55	2.55	2.85
Detroit (f. o. b.)	1.95	1.95	1.90
Duluth (f. o. b.)	2.04	2.04	2.04
Indianapolis, (f. o. b.)	2.09	2.09	2.19
Jersey City	2.25	2.25	2.35
Kansas City, Mo.	2.55	2.55	2.30
Los Angeles	2.76	2.76	2.66
Milwaukee (f. o. b.)	2.20	2.20	2.20
Minneapolis (f. o. b.)	2.22	2.22	2.22
Montreal (f. o. b.)	1.70	1.70	1.41
New Orleans	2.65	2.65	2.40
New York	2.25	2.25	2.25@2.35
Peoria (f. o. b.)	2.22	2.22	2.22
Philadelphia	2.40	2.40	2.31@2.41
Pittsburgh (f. o. b.)	2.05	2.05	2.04
St. Louis	2.45	2.45	2.45
St. Paul (f. o. b.)	2.22	2.22	2.22
San Francisco	2.41	2.41	2.41
Seattle	2.70	2.70	2.70
Toledo (f. o. b.)	2.20	2.20	2.20

Current mill-prices per barrel, in carloads, without bags, f.o.b.:

Alpena, Mich.	$1.65	Lehigh Valley District	$1.75
Buffington, Ind.	1.80	Mason City, Ia.	1.80
Clinchfield, Ga.	1.65	Mitchell, Ind.	1.90
Fordwick, Va.	2.05	North Birmingham, Ala.	1.35
Hannibal, Mo.	1.90	Richard City, Tenn.	1.70
Hudson, N. Y.	1.75	Steelton, Minn.	1.85
Iola, Kan.	1.85	Universal, Pa.	1.80
La Salle, Ill.	1.90	Wyandotte, Mich.	1.70
Leeds, Ala.	1.65		

SAND AND GRAVEL—Dealers' quotations per cu.yd. delivered. Weight of sand, 1½ tons per cu.yd.; gravel, 1½ tons per cu.yd., unless otherwise specified in pounds.

	Gravel		Sand
	1½ In.	¾ In.	
Atlanta, per ton	*$2.65*	*$2.65*	*$2.00*
Baltimore, per ton	2.40	2.60	1.70
Birmingham (2,600 lb.)	3.00	3.00	2.65
Boston, per ton	1.90	1.90	1.25
Chicago	1.90	1.90	1.90
Cincinnati, per ton	1.90	1.90	1.60
Cleveland	2.60	2.60	2.50
Dallas	2.60	2.60	2.25
Denver (2,700 lb.)	1.80	1.80	1.30
Detroit (2,600 lb.)	3.25	3.25	2.75
Kansas City, Mo.	.....	.....	.....
Los Angeles, per ton	2.15	2.15	1.30
Minneapolis (2,800 lb.) (3,000 lb.)	2.40	2.40	1.10
Montreal, per ton	1.90	1.90	1.20
New Orleans (2,700 lb.) (2,500 lb.)	3.75	3.75	2.75
New York	3.25	3.25	2.00
Philadelphia, per ton	2.30@3.15	2.30@3.15	1.50@2.31
Pittsburgh, per ton	*2.60*	*2.60*	*2.60*
St. Louis, per ton	2.25	2.25	2.00
San Francisco (2,800 lb.)	1.75	1.75	1.50
Seattle (3,200 lb.) (2,850 lb.)	1.75	1.75	1.75

Note: New York gravel weighs 2,800@3,000 lb. and sand, 2,700 lb.

CRUSHED STONE—Dealers' quotations per cu.yd., delivered. Weight, 1½ tons per cu.yd., unless otherwise specified in pounds:

	1½ In.	¾ In.
Atlanta, per ton	*$2.75*	*$2.75*
Baltimore, per ton	2.75	2.85
Birmingham, Limestone	3.00	3.25
Boston, per ton	2.25	2.25
Chicago, Limestone	1.90	1.90
Cincinnati, per ton	2.50	2.50
Cleveland, per ton	2.70	2.70
Dallas	3.25	3.40
Denver, Granite (2,700 lb.)	2.50	2.50
Detroit, Limestone, per ton	3.00	3.00
Kansas City, Limestone, per ton, at plant	2.00	2.00
Los Angeles, per ton	2.15	2.15
Minneapolis, Limestone (2,600 lb.)	2.40	2.40
Montreal, per ton	2.10	2.10
New York, Limestone	3.25	3.25
Philadelphia, Limestone, per ton	2.30@3.15	2.30@3.15
Pittsburgh per ton	*2.75*	*2.75*
St. Louis, per ton (2400 lb. per cu.yd.)	1.95	1.95
San Francisco, Trap rock (2,400 lb.)	1.65	1.65
Seattle, (2,700 lb.)	1.90	1.90

CRUSHED SLAG—Manufacturers' quotations on crushed slag in carloads, per net ton, at plant:

	1½-In.	¾-In.	Roofing	Sand
Birmingham, Ala.	$0.90	$1.15	$2.05	$0.55
Buffalo District	1.25	1.35	2.25	1.25
Cleveland, Ohio	*1.15*	*1.15*	.....	*.80*
Eastern Pa. and Northern N. J.	1.25	1.25	2.00	1.25
Toledo, Ohio	1.25	1.25	1.50	1.25
Western Pennsylvania	1.25	1.25	2.00	1.25
Youngstown District	1.30	1.40	2.00	1.30

HOLLOW TILE—Dealers' quotations on hollow building tile per block, delivered to contractors in lots of 2,000 pieces or over:

	4x12x12	6x12x12	8x12x12	10x12x12	12x12x12
Atlanta	*$0.072*	*$0.099*	*$0.135*	*$0.181*	*$0.202*
Baltimore	.105	.....	.20	.....	.26
Birmingham	.09	.127	.174	.218	.261
Boston	.085	.11	.15	.1875	.255
Chicago	.076	.104	.142	.182	.202
Cincinnati	.074	.105	.136	.175	.205
Cleveland	.064	.088	.128	.171	.19
Dallas	.096	**.12**	**.1785**	**.29**	.....
Denver	.0975	.135	.175	.2125	.25
Detroit	.096	.132	.18	.235	.261
Kansas City	.0525	.077	.158	.....	.242
Los Angeles	.085	.122	.175	.232	.285
Minneapolis	.0675	.0845	.131	.134	.1896
Montreal	.12*	.....	.22†	.....	.....
New Orleans	.086	.118	.16	.212	.256
New York	.0864	.1296	.162	.....	.....
Perth Amboy, N.J. (f.o.b.)	.....	.....	.....	.2388	.2956
Philadelphia	.105	.14	.215	.28	.34
Pittsburgh	.068	.....	.1175	.....	.1726
St. Louis	.078	.104	.145	.175	.21
San Francisco	.108	.156	.255	.....	.....
Seattle	.085	.115	.18	.....	.....

*4x4x12. †8x8x12.

BRICK—Dealers' quotations, delivered, per thousand are as follows:

		Paving	
	Common	3x8½x4-in.	3½x8½x4-in.
Atlanta	*$12.75*	$38.00*	$45.00†
Baltimore	**15.00**	40.00	46.00
Birmingham	15.00	30.00*	34.00†
Boston	16.75	43.00	*48.00*
Chicago	12.00	42.00	45.00
Cincinnati	18.00	40.00	45.00
Cleveland	14@16	33.00	36.00
Dallas	**14.50**	35.00	.....
Denver, salmon	12.00	.....	.....
Detroit	*15.00*	**34.50**	**38.50**
Kansas City	14.00	.....	.....
Los Angeles	11.00	.....	.....
Minneapolis	12.75	.....	.....
Montreal	20.33	.....	.....
New Orleans	16.50	40.00*	50.50
New York	*13.50@14.50*	45.00	51.00
Philadelphia	17.00	40.00	46.00
Pittsburgh	17.00	40.50	45.00
St. Louis, salmon	13.00	40.00	42.50
San Francisco	14.50	40.00	45.00
Seattle	14.00	50.00	55.00

*2½x8½x4 in. †3x8½x4.

LIME—Dealers' quotations, delivered to job:

	Hydrated, per Ton		Lump, per Barrel	
	Finishing	Common	Finishing	Common
Atlanta	*$21.00*	*$11.50*	.....	.....
Baltimore	20.00	14.00	$2.55†	.....
Birmingham	22.00	16.00	3.00†	$2.00†
Boston	21.00	14.50	3.80*	2.90*
Chicago	18.00	14.00	18.00‡	1.35†
Cincinnati	18.00	13.20	.....	13.20‡
Cleveland	20.00	16.00	2.50†	2.50†
Dallas	20.00	.....	.....	18.00‡
Denver	32.00	23.75	3.80*	3.00*
Detroit	19.20	14.80	2.20†	2.20†
Kansas City	16.00	12.50	.....	2.75†
Los Angeles	25.00	18.00	2.85†	17.00‡
Minneapolis	25.50	21.00	.....	1.70†
Montreal	19.75	.....	.....	15.00‡
New Orleans	.....	.....	2.60†	1.60†
New York	21.00@22.00	14.00@15.00	4.00@4.10*	3.15@3.25*
Philadelphia	22.00	15.00	.....	.....
Pittsburgh	**21.00**	**19.00**	.....	.....
St. Louis	24.00	18.00	2.75†	15.00‡
San Francisco	27.50	20.00	.....	1.70†
Seattle, paper sacks	36.00	24.00	.....	2.80†

*Per 280-lb. bbl. (net). †Per 180-lb. (net). ‡Per ton.

CONCRETE BLOCKS—Manufacturers' quotations on standard, 8x8x16-in., hollow, delivered to job, each:

Boston	$0.18@.20	Minneapolis, f.o.b.	$0.15
Brooklyn and Queens	*.12@.14*	New Orleans	.22
Cleveland	.16@.17	Philadelphia	.18@.25
Denver	.22	Pittsburgh	.20
Detroit	.15	St. Louis	.18

SLATE—Roofing, genuine Bangor, f.o.b., quarry, Bangor, Pa., per square:

No. 1 Clear	$10.50@$14.00
No. 1 Ribbon	9.00@10.25
Medium Clear	9.50@11.25

Road and Paving Materials

PAVING STONE—Dealers' quotations, f.o.b., in carloads or in cargo lots, for granite blocks, 4x8x4-in., dressed:

Atlanta	$3.00 per sq.yd
Baltimore	3.00 per sq.yd.
Boston	135.00 per M.
Chicago, 5 in.	3.25@3.90 per sq.yd.
Cincinnati	110.00 per M.
Cleveland	115@120 per M
Detroit, 5 in.	3.00 per sq.yd.
Kansas City	3.50 per sq.yd.
Minneapolis, Sandstone, 4½x8x5 in.	2.80 per sq.yd.
Montreal	104.75 per M.
New Orleans	2.80 per sq.yd.
New York, 5 in., Grade 1, 30 blocks per sq.yd.	150.00 per M.
Philadelphia	125.00 per M.
St. Louis, 4x5x8 to 12 in.	3.50 per sq.yd.
San Francisco, Basalt block, 4x7x8 in.	70.00 per M.

Current Prices of Construction Materials

Road and Paving Materials—Continued

WOOD-BLOCK PAVING—Dealers' quotations, f.o.b., in carloads:

	Size of Block	Treatment	Per Sq.Yd.
Atlanta	3½	16	$2.25
Boston	3½	16	2.50
Chicago	3½	12	2.10
Cincinnati	3½	16	2.35
Dallas	3½	18	3.90
Kansas City	3½	16	2.50
Minneapolis	3½	16	2.75
Montreal	4	16	4.50
New Orleans	3½	16	2.50
New York	3½	16	2.70
St. Louis	3½	16	2.30

FLAGGING—Dealers' quotations, alongside dock, New York: Manhattan and Bronx, 4 ft. wide, 24c. per sq.ft.; Queens, 5 ft wide, 26c. per sq.ft.

CURBING—Dealers' quotations: *New York*: Bluestone, f.o.b. barge, New York, 5x16 in., rough, 90c. per lin.ft., cutting charges extra. *Birmingham*: Limestone, 5x18-in., f.o.b., $1.05 per lin.ft. *St. Louis*: Class "B" straight, 5x16 in., f.o.b., *$1.00* per lin.ft.; roundings, *$1.50* per lin.ft.

ASPHALT—Manufacturers' quotations per ton in packages (350-lb. bbls. or 425-lb. drums); also in bulk in carload lots, f.o.b. points listed:

	Package	Bulk
Atlanta (Mexican)	$22.55	$18.40
Baltimore (Standard Oil, f.o.b. refinery)	21.75	17.75
Birmingham (Mexican)	27.00	23.00
Boston (Mexican)	*23.50*	18.00
Chicago (Texas)	23.50	19.30
Cincinnati (Kentucky Rock)	.....	12.30
Cleveland	24.00	20.00
Dallas (Texas)	*23.75*	.....
Denver (California)	35.00	.....
Detroit (Mexican)	19.72	15.69
Kansas City, Mo. (Texas)	25.30	20.30
Los Angeles ("D" Grade, California, f.o.b., El Segundo)	18.00	12.00
Maurer, N. J. (Bermudez)	30.00	.....
Maurer, N. J. (Trinidad)	25.00	.....
Minneapolis, (Stanolind, f.o.b., Twin Cities)	24.10	19.10
Montreal (Imperial)	28.00	21.50
New Orleans (Texas)	24.00	21.00
New York (Texas)	22.50	18.50
Philadelphia (Mexican)	18.00	15.00
Pittsburgh (Standard Oil)	24@26	1¼@18
St. Louis (Mexican)	21.50	17.50
San Francisco, (f.o.b. refinery, Oleum, Calif.)	18.00	12.00
Seattle, ("D" grade, California, f.o.b., Richmond refinery)	19.50	13.50

ROAD OILS—Manufacturers' quotations, f.o.b., in tank cars, 8,000 gal. minimum, per gal.:

Birmingham, 40@50% asphalt	$0.0525
Birmingham, 50@60% asphalt	.0525
Dallas, 40@50% asphalt	.06
Dallas, 50@60% asphalt	.06
New York, 40@50% asphalt (at terminal)	.06
New York, 50@60% asphalt (at terminal)	.06
St. Louis, 40@50% asphalt	.0342
St. Louis, 50@60% asphalt	.0357

Iron and Steel

PIG IRON—Producers' quotations, per gross ton, f.o.b.:

Birmingham, No. 2 fdry., silicon 1.75@2.25	*$15.00*
Pittsburgh, basic, incl. freight ($1.76) from Valley	*19.26*

STRUCTURAL STEEL—Manufacturers' and dealers' quotations per 100 lb.:

	Shapes, 3 to 15-In.	Plates, ¼-In
Birmingham, large mill lots, f.o.b.	$2.15	$2.15
Chicago, warehouse, delivered	3.10	3.10
Cleveland, warehouse, delivered	3.00	3.00
Dallas, warehouse, delivered	3.60	3.60
New York, warehouse, delivered, up to 3,999 lb.	3.30	3.30
Pittsburgh, large mill lots, f.o.b., (June 27, 1929)	1.95	1.95
St. Louis, warehouse, delivered	3.25	3.25
San Francisco, warehouse, delivered	3.15	3.15

BARS, CONCRETE REINFORCING—Manufacturers' and dealers' quotations on bars rolled from billets, per 100 lb. for ¼-in.:

Birmingham, large mill lots, f.o.b.	*$2.05*
Chicago, warehouse, delivered	2.40@3.00
Cleveland, warehouse, delivered	2.25@2.44
Dallas, warehouse, delivered	*3.40*
New York, warehouse, delivered, over 5 tons	2.90
Pittsburgh, large mill lots, stock lengths, f.o.b.	2.05
St. Louis, warehouse, delivered	3.15
San Francisco, warehouse, delivered	2.25

EXPANDED METAL LATH—Dealers' quotations per 100 sq.yd., painted, delivered to job in less-than-carload lots:

Lb. per Sq. Yd.	New York	Birmingham	Chicago	St. Louis	Dallas	San Francisco
2.2	$17.50@$19.00	$26.00	$24.50	$22.00	$27.50	$28.50
2.5	18.50@20.00	27.00	25.50	23.00	29.00	29.50
3.0	20.00@21.00	29.00	27.00	25.00	31.00	32.00
3.4	22.00@22.50	30.50	28.00	26.50	32.50	34.00

WIRE REINFORCEMENT FOR CONCRETE—Manufacturers' quotations per 100 sq.ft. in carloads at mills; and dealers, delivered in lots of 10,000 sq.ft. or over; plain 4 in. by 4 in. mesh:

Style Number	Weight in Pounds per 100 sq.ft.	Pittsburgh Mill	Chicago District Mill	Warehouse Delivery: New York	St. Louis	Dallas	San Francisco
032	22	$0.99	$1.01	$1.39	$1.45	$1.13	$1.22
049	28	1.26	1.29	1.76	1.80	1.38	1.55
068	35	1.54	1.58	2.18	2.25	1.67	1.91
093	40	1.98	2.03	2.79	2.90	2.00	2.46
126	57	2.45	2.51	3.45	3.55	2.55	3.03
153	68	2.92	2.99	4.13	4.25	3.15	....
180	78	3.35	3.43	4.73	4.85	3.47	....

STEEL SHEETS—Manufacturers' and dealers' quotations per 100 lb., base:

	Blue Annealed No. 10 *	Black No. 24	Galvanized No. 24
Chicago, warehouse, delivered	$3.35	$4.05	$4.90
Cleveland, warehouse, delivered	3.25	3.90	4.75
New York, warehouse, delivered	3.90†	4.00	4.75
Pittsburgh, large mill lots, f.o.b.	2.20	2.85@2.95	*3.50*@3.70
St. Louis, warehouse, delivered	3.45	4.25	5.10
San Francisco, warehouse, delivered	3.80	4.90	5.30

*Light plates †Up to 3,999 lb.

WIRE ROPE—Discounts from manufacturers' list price on regular grades of bright and galvanized, Eastern Territory, New York, and East of Missouri River:

	Base
Cast steel round strand rope	20%
Galvanized iron rigging and guy rope (add to list)	12½%
Galvanized steel rigging and guy rope	7½%
Plow steel round strand rope	35%
Round strand iron and iron tiller	5%
Special steel round strand rope	30%

Discount 5 points less than discount for Eastern territory: California, Oregon, Nevada, Washington, Wyoming, New Mexico, Colorado, North Dakota, Nebraska, Kansas, Oklahoma and Texas. Discount 10 points less than discount for Eastern territory: Arizona, Montana, Idaho and Utah.

RIVETS—Manufacturers' and dealers' quotations on structural rivets, round-head, ½-in., full kegs, per 100 lb.:

Chicago, warehouse, delivered	$4.00
Dallas, warehouse, delivered	4.90
New York, warehouse, delivered	4.50*
Pittsburgh, large mill lots, f.o.b.	3.10
St. Louis, warehouse, delivered	3.95
San Francisco, warehouse, delivered	5.65
Seattle, warehouse, delivered	5.50

*This price is for full kegs; broken kegs are $6.00 per 100 lb.

STEEL SHEETPILING—The manufacturers' base price, f.o.b., Pittsburgh, for large mill lots is $2.25 per 100 lb.

TERNE PLATE—I C, 8-lb. coating, 20x28-in., f.o.b., Pittsburgh mill:

Per package	$11.20

SHIP SPIKES—Dealers' quotations per 100 lb., black, from warehouse stocks; galvanized are about $1.75 per 100 lb. higher:

	½-In.	⅝-In.	¾-In.
San Francisco	$5.55	$5.10	$4.95
Seattle	7.75	5.65	5.50

Pittsburgh mill base in lots of 200 kegs or more, **$3.80** per 100 lb.

WIRE NAILS—Dealers' quotations per 100 lb. keg, base, delivered from warehouse stocks, also Pittsburgh mill base:

Pittsburgh Mill	Birmingham	Chicago	St. Louis	Dallas	San Francisco	Montreal
$2.65@$2.75	$3.30	$3.20	$3.05	$3.75	$3.35	$4.95

SCRAP—The prices following are, f.o.b., per ton, paid by dealers:

	New York Per Gross Ton	Chicago Per Gross Ton	Detroit Per Gross Ton
No. 1 railroad wrought	$12.00@$12.50	*$15.00@$15.50*	$15.00
Stove plate	7.75@ 8.50	*13.50@ 14.00*	10.50@ 11.00*
No. 1 machinery cast	17.00	*16.50@ 17.00*	12.00@ 12.50*
Machine shop turnings	7.25@ 7.50	7.50@ 8.00	7.25
Cast borings	7.00@ 7.25	10.00@ 10.50	9.75
Railroad malleable	14.00@ 14.50	*17.00@ 17.50*	14.00
Re-rolling rails	13.00@ 13.50	17.50@ 18.00	15.00
Re-laying rails, 56@60 lb.	23.00@ 24.00	23.00@ 25.00	.....
Heavy melting steel, No. 1	12.00@ 13.00	*15.00@ 15.50*	14.50@ 15.00
Iron and steel pipe	11.25	*10.00@ 10.50*	8.75@ 10.50

*Net ton.

FREIGHT RATES—On finished steel products in the Pittsburgh district, including plates, structural shapes, merchant-steel bars, pipe fittings, plain and galvanized wire nails, rivets, spikes, bolts, flat sheets (except planished), chains, etc., the following freight rates are effective in cents per 100 lb., in carload lots of 36,000 lb. or 18 tons:

Atlanta	$0.58	Detroit	$0.29
Baltimore	.31	Kansas City	.71*
Birmingham	.58	New Orleans	.67
Boston	.365	New York	.34
Buffalo	.265	Pacific Coast (all rail)	1.15†
Chicago	.34	Philadelphia	.32
Cincinnati	.27	St. Louis	.405
Cleveland	.19	St. Paul	.60
Denver	1.15†		

*Except iron or steel pipe and fittings. †Minimum weight on structurals, 60,000 lb.

Railway Materials and Supplies

STEEL RAILS—Manufacturers' quotations per gross ton, f.o.b., for large mill lots:

	Pittsburgh	Birmingham	Chicago
Standard openhearth rails	$43.00	$43.00	$43.00
Light rails, 25 to 45 lb.	36.00	34@36	34@36
Re-rolled rails	34@36	34@36	34@36

RAILWAY TIES—Dealers' quotations, f.o.b., for fair-sized orders:

		6 In. x 8 In. by 8 Ft.	7 In. x 9 In. by 8½ Ft.
New York	Long-leaf sap pine, untreated	$1.10	$1.30
	Creosoted—prices on application.		
Birmingham	Southern pine, untreated	1.10	1.25
	Southern pine, creosoted	1.60	1.75
	White oak, untreated	1.40	1.78
Chicago	Oak, empty cell, creosoted	1.80	2.40
	Oak, zinc treated	1.60	2.10
	Southern pine, creosoted	1.60	2.10
	White oak, untreated	1.13	1.60
St. Louis	Red oak, creosoted	1.43	2.05
	Sap pine or cypress, untreated	.88	1.20
San Francisco	Douglas fir, green, untreated	.82	1.14
	Douglas fir, empty cell, creosoted	1.73	2.32
Montreal	Birch or maple, untreated	.75@1.25	.75@1.25
	Birch or maple, creosoted	1.20@1.30	1.50@1.60

Current Prices of Construction Materials

Railway Supplies—Continued

TRACK SUPPLIES—Manufacturers' and dealers' quotations per 100 lb., f.o.b., Pittsburgh mill, for large mill lots, together with warehouse prices at other places named:

	Pittsburgh	Chicago	Birmingham	St. Louis	San Francisco
Standard spikes, ⅜-in. and larger	$2.80	$3.55	$3.50	$3.65@$3.95	$3.85
Track bolts	3.80	4.55	4.50	4.80@4.95	4.85
Standard section angle bars, splice bars or fish plates	2.75	3.40	3.50		

Tie plates: Price at Pittsburgh and Chicago mills, $2.15 per 100 lb.

Pipe

WROUGHT-STEEL PIPE—Discounts from manufacturers' and dealers' standard lists:

	1 to 3-In. Butt Weld		2½ to 6-In. Lap Weld	
	Black	Galvanized	Black	Galvanized
Chicago, warehouse, delivered	54%	41%	51%	38%
Cleveland, warehouse, delivered	55½%	43½%	53½%	40½%
New York, warehouse, delivered	50%	36%	45%	32%
Pittsburgh, large mill lots, f.o.b.	62%	50½%	59%	47½%
St. Louis, warehouse, delivered	49%	36%	46%	33%

CAST-IRON PIPE—Prices of U. S. Cast Iron Pipe & Foundry Co., per net ton, for bell and spigot pipe, Class B and heavier, f.o.b., on regular lots of pipe:

	4-In.	6-In. and Over
Birmingham mill	$41.00	$38.00
Burlington (N. J.) mill	41.00	38.00
Chicago	49.20	46.20
New York	43.60	49.60
Pittsburgh	49.50	46.50
St. Louis	46.60	43.60
San Francisco	51.00	48.00

Gas pipe and Class A, $3.00 per ton extra.

SEWER PIPE—Dealers' quotations, delivered, in cents per foot, for standard pipe; 6, 8 and 12-in. are single strength and 18, 24, 30 and 36-in. are double strength:

	6-In.	8-In.	12-In.	18-In.	24-In.	30-In.	36-In.
Atlanta	*$0.13½*	*$0.22½*	$0.75	.....	.....	.....	.....
Baltimore	.....	.30	.58	.....	$1.93	.....	$6.50
Birmingham	.25	.40	.65	$1.50	2.75	$3.90	5.83
Boston	**.185**	**.30**	.54	1.30	2.15	3.50	5.90
Chicago	.15	.28	.54	1.25	2.25	4.75	6.00
Cincinnati	.144	.224	.432	.80	1.44	2.304	4.8175
Cleveland	.18	.28	.54	1.30	2.34	4.68	7.18
Dallas	.256	.42	.794	1.70	3.00	.....	.....
Denver	.161	.23	.414	.816	1.44	.....	.....
Detroit	.18	.28	.6075	1.50	2.70	5.12	7.91
Kansas City	.15	.29	.52	.....	1.80	3.90	.....
Los Angeles	.21	.2825	.51	1.186	2.03	3.39	5.09
Minneapolis	.16	.25	.50	1.15	1.84	3.49	4.97
Montreal	.36	.53	.78	1.48	2.75	4.20	.....
New Orleans	**.195**	**.325**	**.585**	**1.10**	**2.11**	.....	.....
New York	.185	.29	.56	1.35	2.45	4.60	7.07
Philadelphia	.117	.182	.351	1.05	1.89	3.60	5.6375
Pittsburgh	.0945	.147	.2835	.85	1.53	3.024	4.8175
St. Louis	.1645	.26	.468	1.092	1.872	3.65	4.80
San Francisco	.21	.30	.54	1.26	2.16	3.60	.....
Seattle	.22	.30	.54	1.26	2.16	3.60	.....

CLAY DRAIN TILE—Dealers' quotations, delivered, per 1,000 lin.ft.:

Size, In.	New York	Birm'ham	St. Louis	Dallas	San Fran.	Seattle
4	$55.00	$56.00	$50.00	$63.00	$67.50	60.00
6	112.00	105.00	112.00	110.00	112.50	112.00

Miscellaneous

LINSEED OIL—Dealers' quotations on raw oil, f.o.b., in 1- to 4-bbl. lots, per lb.:

New York....**$0.115** Chicago....**$0.117** Minneapolis....**$0.122**

WHITE AND RED LEAD—Dealers' quotations per 100-lb. keg, base price, f.o.b., New York: White, dry or in oil, $13.75; Red, dry, $13.75; Red, in oil, $15.25.

CHEMICALS—Water, sewage treatment, road work, round lots in the New York market:

Sulphate of aluminum, iron free, in bags, per 100 lb.	$2.00@$2.10
Sulphate of copper, in bbl., per 100 lb.	*6.00@ 6.10*
Soda ash, 58%, in bags, per 100 lb.	1.32@ 1.35
Chlorine, cylinders, per lb.	.05@ .08
Bleaching powder, in drums, f.o.b. works, per 100 lb.	2.00@ 2.10
Calcium chloride, in drums, f.o.b. works, per ton	20.00

MANILA ROPE—The number of feet per pound for the various sizes is as follows: ½-in., 8-ft.; ⅝-in., 6-ft.; ¾-in., 4½-ft.; 1-in., 3½-ft.; 1¼-in., 2-ft., 10-in.; 1½-in., 2-ft. 4-in. Following are dealers' quotations per pound for ¼-in. and larger, delivered in 1,200-ft. coils:

Atlanta	$0.228	Kansas City	$0.29
Baltimore	.225	Los Angeles	.25
Birmingham	.26	Minneapolis	.24
Boston	.23	Montreal	.245
Chicago	.22	New Orleans	.25
Cincinnati	.21	New York	.21
Cleveland	.21	Philadelphia	.24
Dallas	.20	San Francisco	.205
Denver	.25	Seattle	.205
Detroit	.24	St. Louis	.215

BUILDING PAPER—Black, in carloads, per roll of 500 sq.ft., f.o.b., producing point $1.97

SLATERS FELT—In carloads, per roll, f.o.b., producing point $0.80

ROOFING MATERIALS—Dealers' quotations, f.o.b., New York, to contractors in carloads:

sphalt felt, per 100 lb.	$2.60
ar felt, per 100 lb.	2.60
sphalt coating, per gal.	.34½
ar pitch, in 350 lb. barrels, per ton	28.00

PREPARED ROOFINGS—Dealers' quotations to contractors, in carloads, f.o.b New York.

Single shingles, slate finish, sufficient to cover 100 sq.ft.	$6.12½
Strip shingles, 4 in 1, hexagonal shape, with Underwriters' label	5.00
Slate surfaced roofing in rolls weighing 85 to 90 lbs.	2.50

WINDOW GLASS—United inches 25, bracket size 6x8 to 10x15, single or double thickness, discount from jobbers' list (Sept. 15, 1928), at New York warehouses:

AA .....83% A .....86% B.....88%

EXPLOSIVES—Manufacturers' quotations per pound for dynamite delivered in small lots, under 200 lb.

	Gelatin 40%	Gelatin 60%		Gelatin 40%	Gelatin 60%
Atlanta	$0.22	$0.245	Los Angeles, f.o.b.†	$0.1875	$0.2225
Baltimore	.215	.2375	Minneapolis	.1925	.2125
Birmingham	.22	.245	Montreal	.195	.22
Boston	.225	.25	New Orleans	.195	.22
Chicago	.195*	.22*	New York	.255‡	.2775‡
Cincinnati	.22	.245	Philadelphia	.215	.24
Dallas	.18	.216	St. Louis	.215	.235
Denver, f.o.b.	.19	.2125	San Francisco	.1625	.1925
Kansas City, Mo.	.2025	.2225	Seattle	.16	.185

*Quantities above 500 lb. but less than a ton. †San Fernando Arsenal. ‡Special gelatin in case lots.

Lumber

Prices Are Per Thousand Feet, Board Measure

New York—Timbers, No. 1 common, rough, delivered to contractor at site of job, in 20 ft lengths and under, per M. ft., b.m.:

	Long-leaf Yellow Pine	Douglas Fir
3x4 to 8x8	$57.00	$43.00
3x10 to 10x10	65.00	43.00
3x12 to 12x12	75.00	46.00
3x14 to 14x14	87.50	50.00

Chicago—Dealers' quotations, f.o.b., in carloads, No. 1 Common, rough, per M. ft. b.m. For delivery to job from stock, in truckloads, add $10 per M. ft.:

	20 Ft. and Under Long-Leaf Yellow Pine	Up to 32 Ft. Douglas Fir
3x4 to 8x8	$43.00	$42.00
3x10 to 10x10	50.50	42.00
3x12 to 12x12	62.50	42.00
3x14 to 14x14	74.50	43.00

San Francisco—Dealers' quotations on rough Douglas fir, No. 1 common, at yards. For delivery to contractor at site of job, add $1.50 to $5 per M. ft.:

	10-16-18 and 20 Ft.	22 and 24 Ft.
3x3 and 4	$28.00	$29.00
3x6 and 8	28.00	29.00
3x10 and 12	28.00	29.00
3x14	31.00	33.00

Other Cities—Dealers' quotations, delivered, No. 1 Common, rough, per M. ft:

	8x8-In. x 20 Ft. and Under				3x12 to 12x12-In. 20 Ft. and Under	
	Pine*	Fir†	Hem-lock	Spruce	Pine*	Fir†
Atlanta	$47.50	.....	.....	.....	$67.50	.....
Baltimore	36.00	*$50.00*	*$53.50*	$61.00	75.00	$50.25
Birmingham	45.00	.....	.....	.....	60.00	.....
Boston	**48.25**	47.00	47.25	**48.50**	**57.50**	52.00
Cincinnati	52.50	62.50	.....	.....	70.00	57.50
Cleveland	65.00	65.00	.....	.....	65.00	65.00
Dallas	65.00	57.50	57.50	55.00	65.00	57.50
Denver	.....	57.00	57.00	55.00	.....	55@58
Detroit	62.50	51.50	.....	.....	68.50	51.50
Kansas City, Mo.	42.80	39.75	.....	.....	57.50	39.75
Los Angeles	.....	44.00	.....	.....	.....	44.00
Minneapolis	58.00	53.25	38.25‡	.....	58@60	53.25@54.75
Montreal	50.00	55.00	.....	.....	**50.00**	48.00
New Orleans	50.00	46.00	.....	44.00	67.00	63.00
Philadelphia	52.00	44.00	44.00	50.00	62.00	43@45
Pittsburgh	55@60	50@55	45@50	54@50	60@65	55@60
St. Louis	*45.00*	39.00	.....	.....	56.50	39.50
Seattle	.....	23.00	.....	.....	.....	23.50

	1x10 In. x 16 Ft. and Under			2x10 In. x 16 Ft. T. & Gr.	
	Pine*	Fir†	Hem-lock	Pine*	Fir†
Atlanta	$60.00	.....	.....	$40.00	.....
Baltimore	*55.00*	$45.00	$45.00	.....	.....
Birmingham	36.00	.....	.....	43.00	.....
Boston	**44.50**	43.00	42.00	48.00	$47.50
Cincinnati	65.00	57.50	.....	42.00	55.00
Cleveland	60.00	55.00	.....	65.00	58.00
Dallas	60.00	.....	.....	.....	.....
Denver	.....	46.00	46.00	.....	50.00
Detroit	45.00	42.00	.....	46.50	44.00
Kansas City, Mo.	50.50	45.75	.....	44.75	36.75
Los Angeles	.....	38.00	.....	.....	57.00
Minneapolis	53.00	47.00	39.75‡	51.00	46.00
Montreal	56.00	48.00	40.00	.....	.....
New Orleans	43.00	40.00	.....	50.00	46.00
Philadelphia	53.00	44.00	42.00	57.00	45.00
Pittsburgh	55@60	50@55	45@50	55@60	50@65
St. Louis	39.00	41.00	38.00	39.00	37.00
Seattle	.....	21.00	.....	.....	23.00

*Long-leaf yellow pine. †Douglas fir. ‡F.o.b.

PILES—Dealers' quotations per lineal foot, pine, with bark on, f.o.b., New York

Diameters	Points	Length	Barge	Rail
12 in. at butt	6 in.	30 to 50 ft.	$0.14½	$0.18
12 in.—2 ft. from butt	6 in.	50 to 59 ft.	.19	.23
12 in.—2 ft. from butt	6 in.	60 to 69 ft.	.21½	.25
14 in.—2 ft. from butt	6 in.	50 to 69 ft.	.25½	.34
14 in.—2 ft. from butt	6 in.	70 to 79 ft.	.27½	.36
14 in.—2 ft. from butt	5 in.	80 to 89 ft.	.35	.41

CONSTRUCTION NEWS

Some of the Week's Large Projects

AMONG the announcements for the current week are the following:

Proposed Work

Dam, Pasadena, Calif., voted $10,000,000.

Tunnel, California, Hy. Dist. Alameda Co. and Contra Costa Co., $4,919,200.

Plant, Hamilton, Ont., Dominion Natural Gas Co., $2,000,000.

Sewers, Wilmette, Ill., Bd. Local Impvts., $1,804,550.

Sewers, Chicago, Ill., Bd. Local Impvts., preliminary plans, $1,198,000.

Road improvement, Atlantic, Ia., Cass Co. voted $1,500,000.

Mill, Bridgeport, Conn., Bridgeport Brass Co., $1,000,000 or more.

High school, Shaker Heights (br. Cleveland), O., $1,000,000.

Road improvement, Waterloo, Ia., voted $1,000,000.

Factory, High Point, N. C., J. P. Tate, et al., total est. $1,000,000.

Club, New York, N. Y., Columbia Riding Club, $1,000,000.

Office, Pittsburgh, Pa., Gulf Refining Co., bids in November, general contract, $1,000,000.

Store and office, New York, N. Y., A. M. Bing & Sons Realty Co., $1,000,000.

Bids Asked

Depot, Omaha, Neb., Union Depot Co., bids about Aug. 1, $3,500,000.

Apartment hotels, New York, N. Y., Hecman Realty Co., bids about Aug. 1, separate contracts, $2,200,000 and $1,250,000.

Sewers, St. Louis, Mo., July 30, by Bd. P. Service, Sect. H, $1,750,000.

Hospital, etc., Newark, N. J., Guilbert & Betelle, archts., take bids about July 15, for Newark Memorial Hospital, $1,250,000.

Hall of records, Paterson, N. J., Bd. Freeholders Passaic Co., bids about July 15, $1,000,000.

Bids Received

Educational, Harrisburg, Pa., State Dept. Property & Supplies, general contract from Nelson & Pedley Constr. Co., Phila., and others, totaling $4,116,795.

Contracts Awarded

Docks, Toledo, O., Hocking Valley R.R., to Wellman-Seaver-Morgan Co., and Industrial Brownhoist Co., both Toledo, est. $6,000,000.

Hydro-electric development, Aberdeen, Wash., Western Washington Electric Light & Power Co., Seattle, to Sanderson & Porter, New York, est. $3,500,000.

Museum, Chicago, Ill., South Park Comrs., to R. C. Wieboldt, Chicago, est. $2,649,000.

Gas pipe line, Texas and Mexico, United Gas Co., Houston, Tex., furnishing pipe to Youngstown Sheet & Tube Co., Youngstown, O., laying pipe to Smith Bros. Inc., San Antonio, Tex., $2,500,000.

Viaduct, bridges, New Jersey State Hy. Comn., Trenton, superstructure viaduct to Strobel Steel Co., Chicago, Ill., $1,387,853; bridges to M. Millimet, Inc., Union City, $99,601.

Sewers, Chicago, Ill., Bd. Local Impvts., to Carmine Roberts, $1,221,882.

Gas pipe line, Colorado, Wyoming Gas Co., Boulder, to Morrison & Gates, Denver, $1,000,000.

Apartment, New York, N. Y., E. P. Halley and Halley Constr. Co., separate contracts, $1,000,000.

Garage, Newark, N. J., Kent Garage Investment Corp., New York, to F. T. Ley, New York, $1,000,000.

Railway, New York, New York, Westchester & Boston R.R., New York, to Dwight P. Robinson, New York, est. $1,000,000.

Public Bond Elections, coming and decided, are listed on Construction News page 4.

Construction News of the Week

Waterworks

Proposed Work

Conn., Putnam — Waterworks improvements, incl. repiping, 1 m.g. tank, $77,000. R. E. Thurston, Bd. Water Comrs.

Ill., Joliet—For 6- to 10-in. mains in West Acie Rd., Glenwood Ave., Gaula, Reed and Catherine Sts. $31,441. A. S. Calkins, City Hall, engr.

Miss., Hattiesburg—Waterworks, sewer improvements, $500,000. T. S. Allen, 65 McCall Bldg., Memphis, Tenn., engrs.

Okla., McAlester — New reservoir, pipe line repairs, rebuilding Coal Creek Dam, $100,000. McAlester Eng. Co., McAlester, engrs.

Ont., Hamilton—Waterworks, incl. c.i. mains, hydrants, valves, services, $154,179. W. L. McFaul, City Hall, engr. Noted May 23.

Que., Sorel—Municipal Council filtration plant, $150,000.

Bids Asked

Conn., Hartford — July 17, by Bd. Water Comrs., 17,000 lin.ft. 42 in., 2,100 lin.ft. 36 in., c.i. bell and spigot, steel, rein.-con. cylinder, or standard coated A. W. W. A. c.i. bell and spigot pipe, for Park Rd. supply main, Contr. 38, West Hartford; adv. E. N.-R. June 27.

Ia., Cedar Rapids — July 11, by City, City Hall, pumping station and filter buildings, former bids rejected. From International Filter Co., 333 West 25th Pl., Chicago, Ill., filter equipment, $60,900; from Carrothers Constr. Co., 6803 East 39th St., Kansas City, Mo., pumps $35,657, steel tanks $7,500, clarifier equipment $22,000; from Republic Flow Meters Co., 2240 Diversey Ave., Chicago, Ill., and Simplex Valve & Meter Co., 68th and Upland Sts., Phila., Pa., venturi meters $3,769; each; from Michigan Valve & Fdry. Co., 3631 Parkinson St., Detroit, Mich., valves, gates, $13,860. Noted May 23.

La., Plaquemine—July 9, by City Engineer, well to be 12 in. standard line pipe, 290 ft. deep, centrifugal well pump, for City Light and Water plant.

Mass., Hopkinton—July 8, by Water Dpt., J. F. Sullivan, chn., waterworks, incl. 1 story brick pumping station, machinery, equipment, shallow wells, 1 mi. water main, $60,000. H. A. Hanson, 296 Boylston St., Boston, engr. Noted Mar. 28.

Mich., Detroit—July 10, by D. C. Grobbel, secy. Dpt. Water Supply, 735 Randolph St., 1 story, 42 ft. high, 98 x 54 ft., brick, steel, stone building for superstructure low lift pumping plant, Water Works Park. G. H. Fenkell, 735 Randolph St., engr.

Nev., Wadsworth — July 20, by H. Beemer, clk., Washoe Co. (Reno), 2,400 ft. 8 in. 14 gage, field welded, water pipe line, 3 ft. deep. King & Malone, Cladinos Bldg., Reno, engrs.

N. Y., Brooklyn — July 9, by J. J. Dietz, comr. Water Supply, Gas & Electricity, Municipal Bldg., New York, mains in Atlantic Ave.

N. Y., New York—July 9, by J. J. Dietz, comr. Water Supply, Gas & Electricity, Municipal Bldg., mains in Bronx Zoological Park, Bronx Boro.

N. Y., Scarsdale — July 9, by A. Boniface, village eng., Village Hall, foundations for Martello Tower, Contr. A., Sanborn & Bogert, 30 Church St., New York, consult. engrs.; adv. E. N.-R. July 4.

THESE reports are grouped under each class (water-works, sewers, etc.) and under each stage of the work (proposed, bids asked, etc.) according to the alphabetical order of states.

Where name of official is not given inquiries should be addressed to City Clerk, County Clerk, or corresponding official.

Pa., Franklin—July 15, by City Clerk, 2.5 m.g. filter plant on French Creek, 1 mi. from here. Morris Knowles, Inc., 507 Westinghouse Bldg., Pittsburgh, engrs.; adv. E. N.-R July 4.

Wis., Milwaukee—July 6, by Dpt. P. Wks., 4,522 ft. 6- to 12-in. c.i. mains in Forest Home, 27th and Muskego Aves. $18,000. R. E. Stoelting, comr.

Wis., West Allis—July 9, by Bd. P. Wks., 3,200 ft. 24 in. c.i. main in Jersey St. W. Darby, West Allis, engr.

Ont., Ingersoll—July 8, by P. Utilities Comn., H. G. Hall, supt., additional water supply, incl. deep well, electric pump, mains, drilling 12¼ in. deep well, $15,000. F. A. Dallyn, 71 King St. W., Toronto, engr.

Ont., Leamington—July 7, by R. M. Selkirk, town clk., 1,000 gal. 3 stage centrifugal pump equipped with electric motor on one end and gasoline engine on other, $5,000. J. J. Newman, Davis Blk., Windsor, engr.

Bids Received

N. Y., Brooklyn—Bd. Water Supply, Municipal Bldg., New York, June 25, connecting conduits between City Tunnels 1 and 2, Sterling Pl. and Waverly Ave., from J. P. Welsh Eng. Co., 33 Continental Ave., Forest Hills, $366,490. Noted June 13.

Contracts Awarded

Calif., Los Angeles—Los Angeles Co. Water Works Dist. 13, concrete reservoir, pumphouse, tank house, spill basin, to McDonald & Driver, 311 Bd. Trade Bldg., $29,654.

Md., Baltimore—Bd. Awards, mains in Harford Rd., to Metropolitan Contg. Co., 220 South Highland Ave., $34,397. Noted June 6.

Minn., Winona—H. Magnus, secy. Bd. Municipal Wks., 500,000 gal. steel tank and tower, to Pittsburgh-Des Moines Steel Co., Tuttle and South West 10th Sts., Des Moines, Ia., $39,500. Noted May 23.

N. J., Clifton—Bd. City Council, City Hall, 16 in. main in Allwood Sect., to P. Guliano, Clifton, $20,905. Noted June 13.

N. J., Fair Lawn — Bd. Council, Boro Hall, additional main in Radburn Section, to Orange Eng. Co., Fair Lawn. Est. $60,000. Noted Mar. 14.

O., Canton — Stark Co., mains in Project 17, Edgefield Sanitary Sewer Dist., to Union Constr. Co., Cleveland, $25,943. Noted Jan. 24.

Tex., San Marcos—J. R. Wilhelm, mayor, waterworks improvements, incl. 27,328 8 and 6 in. c.i. pipe, to W. G. Cullum & Co., Central Bank Bldg., Dallas, $44,500. Noted June 6.

Sewers

Proposed Work

Calif., Gridley—City clerk rejected bids June 17, vitr. and concrete sewerage system, N. Ware, city engr.

Ill., Chicago—Bd. Local Impvts., City Hall, preliminary plans 116th Place Sewerage System, incl. 24 in. tile to 8½ ft. brick pipe, $1,198,000. A. J. Schfmayer, ch. engr.

Ill., Normal — Preliminary plans storm, sanitary sewers, $85,000.

Ill., Waverly—Preliminary plans complete storm, sanitary sewerage system, $70,000. W. A. Fuller Co., 2916 Shenandoah Ave., St. Louis, Mo., engrs.

Ill., Wilmette—Bd. Local Impvts., 12 in. to 8½ ft. storm sewer in western section, $1,804,550. C. N. Roberts, 105 North Clark St., Chicago, engr.

Miss., Hattiesburg—See "Waterworks."

Nev., Sparks—Sewage disposal plant, $90,000. C. C. Kennedy, Call Bldg., San Francisco, Calif., engr.

See proposal advertising on page 154.

Constr. News page 1

LEADITE

Trade Mark Registered U.S. Pat. Office

Over 1,000 Miles of Water Mains laid by these 9 Water Plants

—and "every joint" was made with

LEADITE

Fort Worth, Texas
192.85 Miles
Sizes 4" to 36"

Louisville, Ky.
165.82 Miles
Sizes 4" to 48"

New Bedford, Mass.
25 Miles
Sizes 4" to 48"

Tulsa, Okla.
37 Miles
Sizes 6" to 36"

Dayton, Ohio
128.25 Miles
Sizes 4" to 84"

Oklahoma City, Oklahoma
94.50 Miles
Sizes 6" to 30"

Penna. Water Co.
210 Miles
Sizes 4" to 42"

St. Louis, Mo.
90 Miles
Sizes up to 36"

Washington Suburban Sanitary District
Hyattsville, Md.
150 Miles
Sizes 4" to 24"

Pouring 60-in. cast iron bell and spigot pipe joints with LEADITE.

When it is considered that these 9 Water Plants alone, have used LEADITE for jointing more than 1,000 Miles of Water Mains (ranging in sizes from 4-in. to 84-in. diameter, and for pressures varying from 20 to 220 lbs. per square inch), —some idea may be had of the huge total of Water Mains which have been jointed with LEADITE by other Cities—Towns—Private Water Companies—Engineers—Construction Companies—Water Departments of Large Industrial Plants, Railroads and Mines, etc.

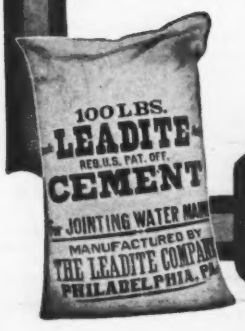
Long experience has proven that LEADITE: Makes Tight joints. Withstands vibration. Does not corrode or rust. Resists electrolysis. Eliminates caulking, and Reduces the cost of digging large bell holes—"Speeds up the completion of the job"

On thousands of miles of Water Mains jointed with LEADITE —all over the country, complete satisfaction has resulted.

LEADITE may be used on any size bell and spigot pipe joints, —and is effective, regardless of the working pressure employed.

The pioneer self-caulking material for c. i. pipe.
Tested and used for over 30 years.
"Saves at least 75%"

THE LEADITE COMPANY
Land Title Building - - Philadelphia, Pa.



No Caulking

(Continued)

N. J., Dumont—Bd. Boro Council, Boro Hall, will not build sanitary sewerage system. $240,000. Project abandoned. Noted June 20.

N. J., Fort Lee—Bd. Boro Council, Municipal Bldg., preliminary plans sanitary sewers in Crescent Way, Mackey Dr., Buckingham and Tom Hunter Rds. $30,000. McClave & McClave, 600 Gorge Rd., Cliffside Park, boro engrs.

N. J., Leonia—Bd. Boro Council, Boro Hall, enlarging disposal plant, new chlorine tanks, altering, enlarging north sewer. $33,000. C. Eckerson, 353 Broad St., boro engr.

N. J., Maywood (br. Hackensack)—Bd. Boro Council, Municipal Bldg., preliminary plans sewer connections, gas and watermains in Esplanade, and Central Ave. $25,000. McClave & McClave, 600 Gorge Rd., boro engrs.

N. J., River Edge—Bd. Boro Council, Boro Hall, preliminary plans sanitary sewerage system. $265,000. J. Zabriskie, North Hackensack, boro engr.

O., Youngstown—Bd. Control bids in fall Crab Creek Dist. Sanitary Sewer. $240,000. G. Turner, Youngstown, engr.

Ont., Islington — Etobicoke Twp. soon takes bids concrete, rein.-con. activated sludge type sewage disposal plant, $80,000; 5 mi. 8 in. and up vitr. clay storm sewers in Humber Bay Dist., $75,000. N. MacNicol, Islington, engr.

Bids Asked

Colo., Alamosa—July 10, by R. Davis, city clk., 9,500 ft. 12- to 27-in. tile sewers 18 x 30 ft., brick building, 9,900 cu.yd. canal excav. Watrous & Tipton, Alamosa, engrs. Noted Apr. 18.

Ill., Decatur—July 15, by Bd. Local Impvts., City Hall, Southeast Sewerage System, 72 and 84 in. monolithic concrete pipe, 36- and 72-in. segmental tile tunnel, 30- to 54-in. rein.-con. pipe, 8- to 27-in. vitr. tile, manholes, special structures, house junctions, other appurtenances. $607,000. Pearse, Greeley & Hansen, 6 North Michigan Ave., Chicago, engrs. Noted Mar. 7.

Ill., Hinsdale—Taking bids 7.75 mi. 12- to 42-in. intercepting sewers, sewage treatment plant, incl. pumps, Imhoff tank, sprinkler filters, sludge bed. $250,000. Pearse, Greeley & Hanson, 6 North Michigan Ave., Chicago, engrs.

Ind., Indianapolis — July 18, at office Bd. Sanitary Comrs., O. C. Ross, pres., City Hall, constructing Fall Creek Interceptor extension.

Kan., Ottawa—July 18, by H. E. Rodgers, city clk., 1,350 ft. 8 in. sewer, 1,800 cu.yd. rein.-con., 5 sewage pumps, 3 blowers, clarifier, mechanism for settling tanks, agitation and heating equipment for sludge digester. $100,000. W. O. Meyers, City Hall, and Black & Veatch, Mutual Bldg., Kansas City, Mo., engrs.

La., New Orleans—Aug. 29, by Sewerage & Water Bd., 526 Carondelet St., A. G. Moffat, secy., drainage canals, pipe lines, Contr. 205-D; adv E. N.-R. July 4.

Mich., Detroit—July 11, by H. J. Dingeman, comr. Wayne Co., Lawyers Bldg., 90,112 ft. 6- to 42-in. concrete or vitr. sewer in Lateral Drain 1, Ecorse Twp. Hubbell, Hartgering & Roth, 2640 Buhl Bldg., engrs.

Mich., Flint—July 12, by N. J. Vermilya, city clk., East Side Interceptor Sewer, 10,126 ft. 42- to 61-in. precast concrete pipe, 3 barrel inverted syphon 16, 20 and 24 in., 2 syphon control chambers, 11,490 ft. 12- to 66-in. storm trunk sewer in Beechwood Park.

Mich., Monroe—July 8, by J. H. Eber, city clk., two 500 g.p.m. vertical motor driven centrifugal pumps against 20 to 25 ft. head. 900 revolutions per min.

Mo., St. Louis—July 30, by Bd. P. Serv., City Hall, Sect. H River Des Peres Project, 16,330 ft. open channel, 140- to 150-ft. wide at bottom. $1,750,000. W. W. Horner, city engr.

N. J., Plainfield—July 25, by Common Council, City Hall, 5,800 lin.ft. 8- to 15-in. sanitary sewers, sewage pumping station, 1,400 lin.ft. 8 in. c.i. force main; 3,000 lin.ft. rein.-con. storm sewer, incl. appurtenances, rearranging, reconstructing intersecting sewers. A. W. Vars, city engr.; adv. E. N.-R. July 4.

N. Y., Allegany—July 5, by Village, sewage disposal plant. Hevenor & Weller, Inc., 5 St. Paul St., Rochester, engrs.

N. Y., Brooklyn — July 10, by J. J. Byrne, pres. Brooklyn Boro, Boro Hall, sewers in Lakeland Pl., Linden Blvd., Lenox and Farragut Rds., Brighton Beach, Tilden and Nassau Aves., Barbey, Jerome, East 43rd, East 39th, East 43rd, Varick, and Bridgewater Sts.

N. Y., Cheektowaga (mail Depew)—July 8, by Town Bd., Hy. superintendent, Forks, N. Y., sewage disposal plant, Sewer Dist. 3. F. Diehl, Ellicott Sq., Buffalo, engr.

N. Y., New York — July 9, by H. Bruckner, pres. Bronx Boro, Crotona Park, 3rd and Tremont Aves., sewers in Country Club Rd., Campbell Dr., Matthews Ave., Eastern Blvd., Agar, Polo, and Reed Pls.

Pa., Phila.—July 10, by Dpt. P. Wks., Bureau Engineering & Surveys, branch sewers in Allen Lane, Dorset St.; main sewers in Little Tacony Creek and Mansfield St. A. Murdock, dir.

Contracts Awarded

Ill., Chicago—Bd. Local Impvts., City Hall, A. J. Schafmayer, ch. engr., Natchez Avenue System of Sewers, incl. 11 mi. 9½ x 12 ft. to 2 ft. tile pipe in West 51st, 52nd, 54th, 55th, 57th, 61st and 62nd Sts., South Natchez, Narragansett, Mobile, Sayre, Nagle and Central Aves., to Carmine Roberts, 9621 Laflin St., $1,221,882. Noted June 6.

Ill., Joliet—Slough Drain Sewerage System, incl. 42- to 72-in. rein.-con., tile pipe, to Powers-Thompson Constr. Co., East 94th St. and The Lake, Chicago, $429,922. Est. $433,678. Noted June 6.

Ia., Charles City—Pit House, ejector, 9,294 ft. 8 and 10 in. vitr. sewer pipe, to C. F. Wishard, Charles City, $29,284.

New York—Westchester Co. Sanitary Sewer Comn., 192 Martine Ave., White Plains, 2 mi. Sect. E, mostly in tunnel from Hutchinson Valley, Mount Vernon westward toward Bronx Valley, to S. J. Groves & Sons, Inc., $874,000. Municipal Bldg., Ridgefield, N. J.

N. J., Annandale — Dpt. Institutions & Agencies, Trenton, sewage disposal plant at State Reformatory, to N. A. K. Bugbee Co., 206 East Hanover St., $29,000.

N. Y., Long Island City—G. U. Harvey, pres. Queens Boro, Queens Subway Bldg., to Raffaele Iovino, 678 Glenmore Ave., Brooklyn, sewer in Cooper Ave. $474, Davenport Ave. $1,302, 114th Ave. $825; to Matarazzo & Yondola, 111th Ave. $41,197, 204th St. $2,248; to Del Mel Constr. Co., 7624 15th Ave., Brooklyn, Van Wyck Blvd., $1,952; to P. J. Greenough Eng. Co., 9919 Guilford Ave., Forest Hills, Rockaway Beach Blvd., $1,448; to Catapano & Ambrosio, 1016 60th St., Brooklyn, 107th Ave. $22,925, 130th Ave. $9,186; to J. H. Johnson, 37 Britton Ave., Elmhurst, 212th St. $6,560; to E. J. Kelly, Flushing, Jamaica Ave., $14,903; to L. Collins & Son, Whitestone, 163rd St., $720. Grand total $103,741. Noted June 6.

O., Akron—F. E. Swineford, dir. P. Serv., 3,600 ft. 8- to 96-in. rein.-con. or vitr. clay sewers in Bye St. Dist., to T. E. McShaffrey Constr. Co., 173 South Forge St., $39,546, est. $47,000; 4,500 ft. brick trunk sewers in connection with Grade Separation Group 2, Contr. 1, to Walter P. Gibbons Contg. Co., 914 Scovill Bldg., Cleveland, $190,693, est. $250,000. Noted June 13.

O., Canton—G. E. Mudge, serv. dir., East Creek Interceptor Sanitary Sewer, to Garaux Bros. Co., 415 9th St. S. W., $174,000. Est. $199,000. Noted May 30.

O., Canton — Service Director, storm water sewers in Shadyside and Linwood Aves. S. W., to Canton Sand & Gravel Co., 910 3rd St. S. E., $39,974 est. $45,000; 15 mi. sanitary sewers laterals in Fairmont Park Dist., to J. M. McLaughlin, 5815 Nicholson St., Pittsburgh, Pa., $82,712 est. $140,000. Noted May 23.

O., Cincinnati—Hamilton Co., 104,415 ft. 6- to 20-in. vitr. clay sewer in Sewer 31, Dist. 7, to Crumley Jones & Crumley, Temple Bar Bldg., $214,110, est. $278,167; 99,213 ft. 6- to 24-in. Sewer 54, Dist. 1, to C. A. McCann, Lake Forest, Ill., $212,308 est. $270,244. Noted Apr. 18.

Wis., Milwaukee — Dpt. P. Wks., R. E. Stoelting, comr., to Wenzel & Henoch, 498 27th St., sewers in Hampton Ave. $3,422, 4th St. $1,011, River Rd. $2,875, Port Washington Rd. $17,563, Mohawk Ave. $1,596, Iroquois Ave. $2,017, Seneca Ave. $2,079, Lake Dr. $2,335, Fairy Chasm Rd. $3,064, Highland Terrace $1,687, Manor Court $2,604, Bayside Dr. $2,315, Hawthorne Rd. $3,649, Pelham Parkway $10,758, Manor Circle $1,498, Elmdale Ave. $2,686, Greenvale St. $2,706, Brown Deer Rd. $4,958; to Teget Constr. Co., 181 Villard St., Glenview Pl. $1,076, Navajo Ave. $1,674, Port Washington Rd. $3,616, Brown Deer Rd. $7,318. Grand total $66,690.

Ont., Islington—N. MacNichol, engr., Township Offices, Long Branch Sewer Outlet, to Russell Constr. Co. Ltd., Harbour Bldg., Toronto, $16,700; 4 mi. sanitary sewers, to French River Constr. Co., 218 Elm St., Toronto, $32,743; pumping station, to F. Barratt, Lambton Mills, $2,997. Grand total $52,440. Est. $50,000. Noted May 2.

Waste Disposal

Proposed Work

Utah, Ogden—Incinerator, $25,000. H. C. Errett, city engr.

Bridges

Proposed Work

Arkansas—See "Contracts Awarded."

North Carolina — State Hy. Com., Raleigh (**P. means Project**), rein.-con. bridges, culverts on P. 7770, Wilkes Co., $110,000—P. 2060 and P. 2050, Craven Co., $48,000 and $35,000 respectively—P. 827, Cleveland Co., $35,000. J. D. Waldrop, Raleigh, engr.

N. C., Point Harbor—Currituck & Dare Bridge Corp., Currituck, revised plans bridge over Currituck Sound, 1 mi. north of here.

O., Cleveland—New York, Chicago & St. Louis R.R., A. C. Harvey, ch. engr., Terminal Tower, rein.-con. bridge, on East 89th St. $75,000.

Pa., Phila.—Delaware River Joint Bridge Comn., J. Costello, pres., Widener Bldg., Delaware River Bridge Approach, Plaza Tunnel, $300,000.

Wash., Seattle—Northern Pacific Ry. Co., B. Blum, ch. engr., St. Paul, Minn., concrete, steel bascule bridge over Duwamish Waterway, $220,000.

Que., Ascot—Twp. Council, W. W. Baker, secy., bridge, $30,000.

Que., Chicoutimi—Provincial Govt., Dpt. P. Wks., Quebec, bridge over Saguenay River, $250,000.

Bids Asked

Ark., Huntsville—July 13, by Clerk Madison Co., bridge over War Eagle Creek, near Sanders Ford. D. Glass, co. judge.

Iowa—July 9, by State Hy. Comn., Ames, three 40 x 20 ft. span I-beam bridge on creosoted piling, raising 70 x 20 ft pony truss bridge, also 2 box culverts, U. S. Rd. 30, F. A. B. 232, and raising 2 pony truss and 1 plate girder bridges, widening 3 I-beam bridges, 24 x 24 ft. slab bridge, also 8 box culverts and extensions, U. S. Rd. 30, B-289, Crawford Co.—32 x 24 ft. I-beam bridge on creosoted piling, 32 x 24 ft. I-beam bridge on concrete abutments, 70 x 20 ft. pony truss bridge, 1 culvert, raising and widening 24 ft. I-beam span, Rd. 27, B-614, Harrison Co.—raising high truss bridge and adding 32 ft. I-beam approach span, R. 12, B-515, Plymouth Co.—adding two 32 x 24 ft. I-beam approaches and one 20 x 24 ft. wood approach to overhead bridge, U. S. Rd. 30, F. A. B. 303, Tama Co.—raising, widening 24 ft. I-beam span, also 20 box culverts, extensions, U. S. Rd. 34, F. A. B. 83, Union Co.—5 box culverts, U. S. Rd. 71, F. A. B. 178, Page Co. R. F. White, hy. comr.

Kentucky—See "Streets and Roads."

Maryland—July 9, by State Roads Comn., Baltimore, repairing rein.-con. girder bridge, Contr. P-91—reconstructing roadway on bridge Contr. P-99, Prince Georges Co.—rein.-con. slab bridge Contr. Co-51, Caroline Co. G. C. Uhl, chn.; adv. E. N.-R. July 4.

Neb., Wayne—July 16, by C. W. Reynolds, clk. Wayne Co., one concrete, 3 steel bridges.

New Jersey—July 15, by State Hy. Comn., Trenton, bridges over Still Run and Elmer Lake, Route 48, Sect. 21., Malaga-Elmer Rd., Gloucester Co. A. L. Grover, ch. engr.; adv. E. N.-R. July 4.

N. Y., Buffalo—July 9, by Bd. Supervs. Erie Co., Court House, steel plate girder bridge on New Rd., Amherst; steel girder deck bridge on Sardinia-Schutts Corners Rd., Sardinia. G. Diehl, Ellicott Sq., co. engr.

N. Y., Edinburg—July 19, by Bd. Hudson River Regulating Dist., Albany, constructing Batchellerville Bridge, nineteen 150 ft. steel cantilever spans, in connection with development Sacandaga Project.

O., Warren—July 16, by Comrs. Trumbull Co., 340 ft. rein.-con. bridge over Mahoning River, on West Market St. W. P. Brown, Finance Bldg., 750 Prospect Ave., Cleveland, engr. and archt.

Contracts Awarded

Alabama—See "Streets and Roads."

Arkansas — State Hy. Comn., Little Rock, 1,460 ft. concrete bridge over Arkansas River, Ozark, Franklin Co., to M. E. Gillioz, Monett, Mo., $338,352. Est. $380,000—5 concrete bridges in Bradley and Cleveland Counties, to Lakeside Bridge & Steel Co., Little Rock $124,173. Est. $130,000—rejected bids June 19, bridge Job 587, Garland Co. Noted June 6.

California—State Hy. Comn., Sacramento, two 31 ft. rein.-con. girder span bridge over Salmon Creek, near Beatrice, Humboldt Co., to F. J. Maurer & Son, Eureka, $10,903—timber bridge over Little Truckee River, 4 mi. north of Myers, El Dorado Co., to Lord & Bishop, Oroville, $14,090. Noted May 23.

Louisiana—State Hy. Comn., Baton Rouge, steel bridge with combination trestle approach in Natchitoches Parish, to Moore Bros., New Orleans, $45,297; bridge on Livonia-Opelousas Hy., St. Landry Parish, to W. Clopton, Elba, $71,525. Noted May 16.

Maryland — State Roads Comn., Baltimore, altering 100 ft. double span concrete arch bridge over Patapsco River, Contr. B-113, and altering approaches to hy. bridge over Pennsylvania R. R. at Winans Sta., Contr. B-115, to Forbes-Murphy Contg. Co., 326 St. Paul St., Baltimore, $48,866 and $22,940 respectively. Noted June 13.

Maryland — State Road Comn., Baltimore, double span rein.-con. girder bridge over Jennings Run, Contr. A-59, Allegany Co., to Allied Pneumatic Services, Inc., Lenox Bldg., Wash., D. C., $14,099. Noted May 30.

Md., Baltimore—Bd. Awards, Cold Spring Lane Bridge, 644 ft. long, concrete, steel over Jones Falls and Northern Central R.R., to Catalano & Pecora, Old Town Natl. Bank Bldg., $163,744.

Mass., Northampton — City, Street Dpt., 1 rein.-con., and one I-beam slab bridge 30 ft., to Warner Bros. & Goodwin, Inc., Sunderland. Est. exceeds $25,000.

Michigan—Kent Co. Road Office, Grand Rapids, S. R. Bridge 1 of 41-17-22, C-1 and 2, three 50 ft. spans steel deck girder, for State Hy. Dpt., Lansing, to Price Bros., Tussing Bldg., Lansing, $39,056; steel, to American Bridge Co., 1328 Buhl Bldg., Detroit, $6,443. Noted May 30.

Missouri and Tennessee—See "Railways."

Constr. News page 2

For Economy

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Subsidiary of United States Steel Corporation

Chicago Pittsburgh Minneapolis Duluth Cleveland Columbus New York

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Bridges (Continued)

New Jersey—State Hy. Comn., Trenton, embankment, superstructure for viaduct approaches, and bridge across Hackensack River, Hudson Co., to Strobel Steel Co., 53 West Jackson Blvd., Chicago, Ill., $1,387,853; 3 bridges, West Side Park, Hudson Co., to M. Millimet, Inc., 988 Bergenline Ave., Union City, $99,601. Noted June 6.

North Carolina — State Hy. Comn., Raleigh (P. means Project), rein.-con. bridges, culverts on P. 5800, Randolph Co., to Wannamaker & Wells, Inc., Orangeburg, S. C., $70,940—P. 521, Davidson Co., to G. M. Hughes, Florence, S. C., $43,374—P. 1590, Nash Co., to Kiker & Yount, Reidsville, $28,450. Grand total $142,764. Noted May 16.

O., Cleveland—Cleveland, Cincinnati, Chicago & St. Louis Ry., Cincinnati, O. H. Baldwin, ch. engr., 60 x 224 ft. rein.-con. bridge on West 117th St. and Park Ave., to Hecker-Moon Co., 8701 Union Ave. Est. $200,000.

Wisconsin — State and Columbia, Dodge, Green Counties Hy. Comns., Madison, Manning Street Bridge, to Garvey-Weyenberg Constr. Co., Appleton, $14,680—Lowell Bridge approaches, to G. G. Lehmann, Watertown, $146—concrete paving 1,618 sq.yd. Deadmans Curve, Dodge Co., to W. E. Stone, Whitewater, $8,695. Grand total $23,521. Noted June 6.

Ont., Forest Hill—L. W. Archer, village clk., general contract 415 ft. concrete steel truss span bridge on Bathurst St., to E. P. Muntz Co. Ltd., Temple Bldg., Toronto, $124,244; steel, to Dominion Bridge Co. Ltd., 1139 Shaw St., Toronto. Total est. $250,000. Noted Apr. 25.

Que., Joliette—Canadian Pacific R.R., Windsor Sta., Montreal, J. M. R. Fairbairn, ch. engr., bridge, to Sansregret & Marcie, Joliette, $26,000.

Dams

Proposed Work

Calif., Sonora—Pacific Gas & Electric Co., 245 Market St., San Francisco, multiple arch concrete dam for power purposes in Lyons Valley, near here. To exceed $200,000. Private plans.

Contracts Awarded

Calif., Stockton—A. L. Banks, city clk., 400,000 sacks cement for high gravity type flood control dam, south of Valley Springs, Calaveras Co., to Calaveras Cement Co., $850,000. Noted June 27.

Mich., Lowell—Village, rein.-con. steel dam on Flat River, 9 mi. from here, to A. Phelps & Son, 6319 Michigan Ave., Detroit, $54,650. Noted June 20.

Tex., San Angelo—West Texas Public Utilities, Abilene, 6,000 ft. power dam, 45 ft. high, 225 ft. wide at bottom, across Concho River, 6 mi. southwest of here, impounding 10,500 acre ft. water, to W. E. Callahan Constr. Co., Kirby Bldg., Dallas, $800,000. Noted May 30 under "Contracts Awarded."

Railways

Proposed Work

Colorado—Fountain Sand & Gravel Co., 810 East 8th St., Pueblo, 3 mi. narrow gage railroad track from Park Hill to Salt Creek.

Texas—Gulf Texas & Western Ry., Co., c/o W. F. Knox, recdr., Dallas, stopped plans and withdrew application for railway between Seymour and Paducah. Noted Jan. 17.

Bids Asked

Missouri and Arkansas — See "Contracts Awarded."

Contracts Awarded

California—Southern Pacific R.R. Co., G. W. Boeschke, ch. engr., 65 Market St., San Francisco, 25,000 cu.yd. excav. in connection with double tracking in San Jose, to W. M. Willett, 430 Natoma St., San Francisco; 43,000 cu.yds. excav. in connection with grading line from Logan to Watsonville, to Granite Constr. Co., Watsonville.

Missouri and Arkansas — St. Louis Southern Ry. (Cotton Belt System), W. S. Hanley, ch. engr., Buder Bldg., St. Louis, Mo., grading, culverts 11 mi. standard gage railroad line between Hornersville, Mo. and Leachville, Ark., to Winston Bros. Co., 410 Buder Bldg., St. Louis, ballasting, tracks, bridges, own forces.

Missouri and Tennessee — St. Louis-San Francisco Ry., P. G. Jonah, ch. engr., Frisco Bldg., St. Louis, Mo., reconstructing piers, abutments for bridges on Springfield, Mo. and Memphis, Tenn., Div., to Hedges-Weeks Constr. Co., Holland Bldg., Springfield, Mo. Est. $50,000.

New York—New York, Westchester & Boston R.R. Co., L. S. Miller, pres., 481 Morris Park Ave., New York, 2 mi. railroad from Rye to Portchester, to Dwight P. Robinson, 125 East 46th St., New York. Est. $1,000,000. Contractor takes bids about July 15 on materials.

Wyoming—Union Pacific R.R. Co., G. J. Adamson, ch. engr., Omaha, Neb., 2.76 mi. side tracks, 150,000 cu.yd. channel changes, at Green River, to Utah Constr. Co. Ogden, Utah, $80,000.

Airports

Proposed Work

Mass., East Boston (sta. Boston)—City of Boston, Park Dpt., 33 Beacon St., Boston, additional improvements to airport. $200,000 appropriated.

Mich., Grosse Ile—Aircraft Development Corp., 3400 Union Trust Bldg., Detroit, plans by Raseman & Raseman, 520 Murphy Bldg., Detroit, 2 and 3 story, 70 x 190 ft., rein.-con., brick, steel airport terminal, plain found., at Airport. $150,000.

Okla., Erick—City airport. $25,000. A. Wilhelm, city clk.

Okla., Miami — Airport. $75,000. A. R. Batts, mayor.

Okla., Stillwell—Preliminary plans airport. $25,000. H. T. Williams, city atty.

Ont., Kitchener—A. E. Roy, Bd. Trade, airport. $100,000.

Bids Asked

Ont., Toronto—See "Contracts Awarded."

Contracts Awarded

O., Columbus—Dpt. Serv., W. H. Duffy, dir., 124 x 206 ft., concrete, brick, steel hangar, 30 ft. high, also 30 x 150 ft. shop, Municipal Airport, to G. H. Moor, 36 West Gay St., $82,160, electrical work, to Electric Constr. & Maintenance Co., 203 South Front St., $3,320; plumbing and heating, to Huffman-Wolfe Co., 669 North High St., $20,348. Grand total $105,828.

Ont., Toronto—Toronto Harbor Comn., Harbor Bldg., soon takes bids two brick, concrete, sheet metal hangars; concrete ramp, aprons, wharf, day labor. $100,000. J. G. R. Wainwright, Harbor Bldg., engr.

Excavation, Drainage, Irrigation, Levees, River and Harbor

Proposed Work

N. J., Alpine — Palisades Interstate Park Comn., E. W. King, dir., Englewood Cliffs, preliminary plans 200 x 800 ft. timber, concrete, stone boat basin, with track and sheds for winter storage, Hudson River. $50,000. Private plans. Noted June 27.

Wash., Seattle — Permanent concrete sea wall on Alki Ave. between bathing beach and Luna Park. $85,000. W. D. Barkhuff, Seattle, engr.

Bids Asked

Mass., Boston—July 9, by Dpt. P. Wks., dredging 270,800 cu.yd. (scow measurement), in Savin Hill Bay, Dorchester, Boston Harbor. Noted May 30.

Bids Received

N. Y., Port Richmond—Dpt. Parks, W. R. Herrick, pres. Park Bd., Arsenal Bldg., Central Park, New York, June 25, crib bulkhead in Faber Park, from G. B. Spearin, Inc., 75 West St., New York, $18,835; filling earth and one man stone, Faber Park, from P. Lauria, 151 Bway., West New Brighton, $6,835. Noted June 20.

Contracts Awarded

California—See "Railways."

Calif., Benicia—Southern Pacific R.R. Co., G. W. Boschke, ch. engr., San Francisco, grading north approaches, concrete culverts for Suisun Bay Bridge from Suisun Point near Martinez to Army Point near Benicia, to R. G. LeTorneau, 122 Moss Ave., Stockton. Noted Apr. 25 under Unclassified.

Ia., Sigourney—Keokuk Co., changing German Creek Channel, straightening roads, to C. W. Gilliland & Son, Hayesville, $3,289; concrete culverts, to Wallace Lumber Co., Sigourney, $10,763. Noted June 6.

Ia., Toronto—Bd. Supervs. Clinton Co., cleaning ditches, incl. 21,500 cu.yd. dragline excav., restoring 6,600 ft. dikes, in D. D. 11, to Clarke Constr. Co., Clinton, $10,879. Noted May 23.

N. J., Point Pleasant — Mayor and Boro Council, bulkheads, jetties, to J. A. Howland, Rumson, $161,582. Noted June 13.

Wyo., Green River—See "Railways under Wyoming."

Streets and Roads

Bids Asked

Ala., Birmingham—July 30, by City Comn., curbing, guttering, 7 in. concrete paving 1 block 23rd St. S., $5,650—concrete curbing, guttering, 4 ft. concrete sidewalks, 7 in. concrete paving 4 blocks 10th Court N., $20,950—concrete curbing, guttering, cement sidewalks, 2 in. asphalt on 5 in. concrete paving 2 blocks 56th St. and 6th Ave., S., $11,900—1 ft. concrete guttering, 2 in. asphalt on 6 in. concrete paving between street car tracks and brick paving 18 in. on each side, 440 ft. 1st Ave. and 25th St. S., $14,650. A. J. Hawkins, city engr.

Ark., Osceola—July 9, by Comrs. Mississippi Co., grading 115,000 cu.yd. Carson Lake Rd. Impvt. Dist. 6. Morgan Eng. Co., Goodwin Institute Bldg., Memphis, Tenn., engrs.

Calif., San Diego—July 15, by Common Council, curbing, walks, guttering, 6 in. concrete paving 99,462 sq.ft. Locust and Alcott Sts.; 6 in. asphaltic concrete paving 163,307 sq.ft. Froude St. R. W. Jorgensen, city engr. Noted Apr. 25.

Florida—July 23, by State Road Dpt., R. W. Bentley, chn., Tallahassee alternate types paving 9.609 mi. Rd. 17, F. A. Project 64-A, and 9.61 mi. Rd. 17, F. A. Project 64-C, Hillsboro Co.—concrete paving 11.79 mi. Rd. 10, Project 728, Leon Co.—single bituminous on Florida lime rock paving 5.05 mi. Rd. 10, Project 644-C, Wakulla Co.—3 mi. Rd. 27, Project 669-Y, Collier Co.—6.03 mi. Rd. 2, Project 695, Lake Co.—7.65 mi. Rd. 13, Project 742, Alachua Co. J. L. Cresap, state hy. engr.

Indiana—July 9, by J. J. Brown, dir. State Hy. Comn., Indianapolis, bituminous concrete, brick or concrete paving 2.192 mi. Project 31D, Lake Co.—0.62 mi. Project 107-A1, Montgomery Co.—7.095 mi. Project 151A, Jennings Co.—concrete bituminous concrete brick, or rock asphalt paving 11.98 mi. Project 169B, White and Pulaski Counties—grading 2.633 mi. Rd. 56, Sect. M. Scott Co.

Iowa—July 9, by State Hy. Comn., Ames, grading, flumes, paving 83,599 sq.yd. Rd. 59, P-164, Black Hawk Co.—129,390 sq.yd. U. S. Rd. 30, P-611-A, Carroll Co.—212,045 sq.yd. U. S. Rd. 161, F-17, Dubuque Co.—127,879 sq. yd.—U. S. Rd. 161, P-224, Linn Co.—125,342 yd. U. S. Rd. 20, P-609, Webster Co.—1,160 sq.yd. Rd. 140 P-579, Woodbury Co.—10,261 mi. U. S. Rd. 34, incl. 83,722 cu.yd. channel change, P-550 Lucas Co.—graveling 23.5 mi. Rd. 46, P-567, Carroll Co.—14.2 mi. Rd. 35, P-627, Monona, Ida and Woodbury Counties—8.86 mi. Rd. 76, P-513, Muscatine Co.—5,250 ft. 8- to 12-in. tile on Rd. 17, P-301, Emmet Co. R. F. White, hy. engr.

Ia., Mt. Pleasant—July 9, by City Clerk, curbing, guttering, 6 in. concrete paving 12,534 sq.yd. $40,000. Hall & Withington, Centerville, engrs.

Ia., Mt. Pleasant—Bids about July 15, grading, curbing, concrete paving 15 blocks Van Buren, Clay, Locust, Harrison, Green, Webster Madison, Henry and Pearl Sts. Hall & Withington, Centerville, engrs. Noted May 16.

Ia., Montezuma — July 9, at office Auditor Poweshiek Co., improving Chester-Sheridan Rd., 52,541 cu.yd. excav., 7,200 sta.yd. overhaul, 1,020 ft. driveway entrance culverts, also 17 concrete box culverts, 1,958 ft 15- to 24-in. culvert pipe. C. E. Olson, Montezuma, co. engr.

Ia., Newton—July 15, by E. J. Failor, city clk., graveling 6 in. rein.-con. slab paving 3,475 sq.yd.; adv. E. N.-R. July 4.

Ia., Sioux City—July 12, by F. Thompson, city clk., widening, paving 12,000 sq.yd. Stone and Lowell Aves., South Paxton, South Glass, 27th and John Sts. $25,815. L. Hintgen, City Hall, engr.

Kentucky—July 31, by State Hy. Dpt., Frankfort, grading 6 mi. Liberty-Lebanon Rd., S. P. 62-A, G. Casey Co.—3.5 mi. Lancaster-Nicholasville Rd., S. P. 97-A, G. Garrard Co.—4.5 mi Sebree-Slaughters Rd. F R. 76-A, G. Webster Co.—surfacing 5.3 mi. Morgantown-Bowling Green Rd., F. A. 182-A, S. Butler Co.—11.2 mi. Frankfort-New Castle Rd., S. P. 64½-B S. Franklin Co.—10 mi. Benton-Paducah Rd., F. A. 163-A, S. Marshall Co.—7.3 mi. Central City-Drakesboro Rd., S. P. 15-A, S. Muhlenberg Co.—5.6 mi. Mt. Olivet-Blue Lick Rd., S. P. 48-A S. Robertson Co—50 ft. deck girder overhead crossing near Drakesboro, S. P. 15-A, B. Muhlenberg Co. J. S. Watkins, hy. engr.

Md., Chestertown—July 9, by Comrs. Kent Co., traffic bound slag paving 50 mi. secondary roads, 9 ft. Noted Apr. 18.

Massachusetts—July 9, by Dpt. P. Wks., Boston, gravel and bituminous macadam paving 4,200 ft. hy. in Spencer—4,000 ft. Petersham—bituminous macadam paving 11,772 ft. Essex—6,200 ft. Kingston—rein.-con or rein.-con. bituminous macadam paving 4,518 ft. Salem. A. W. Dean, Dpt. P. Wks., engr.

Mass., Newton—July 10, by Street Comrs., City Hall, sheet asphalt and bituminous macadam paving, $25,000 or more. W. P. Morse, City Hall, West Newton, city engr.

Michigan—July 9, by E. D. Crandall, resident engr., Cadillac, concrete paving 3.923 mi. FO 5-19, C-1 and FO15-9, C-1, 20 ft., Antrim and Charlevoix Counties, for State Hy. Dpt., Lansing.

Michigan—July 18, by H. C. Fleming, resident engr., Grand Rapids, concrete paving 2.716 mi. MO41-31, C-1, Kent Co., 40 ft., for State Hy. Dpt., Lansing.

Michigan—July 16, by A. R. Schaefer, resident engr., Newberry, concrete paving 4.276 mi. FO17-31, C-1, 20 ft., Chippewa Co., for State Hy. Dpt., Lansing.

Minn., LeSueur—July 8, by City, J. A. Morgan, clk., grading, curbing, concrete paving 6 blocks. $27,000. E. G. Briggs, 438 Bremer Arcade, Minneapolis, engr. Noted Dec. 6.

Mo., Kirkwood—July 8, by Bd. Aldermen, W. J. Denworth, city clk., bituminous surface treating Smith Ave. between Argonne Dr. and Monroe St.—Peeke Ave. between Kirkwood and Geyer Rds.—Dougherty Ferry Rd. between Geyer Rd. and west city limits—Swan Ave. between Kirkwood Rd. and Taylor Ave.—Taylor Ave. between Jefferson and Washington Aves. W. C. Berry, city engr.

Constr. News page 3

Going Down

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Streets and Roads (Continued)

Mo., St. Louis—July 23, by Bd. P. Serv., City Hall, grading between building lines, Hampton St. between Columbia St. and point 600 ft. north of Wilson St., $77,400—recut granite block paving 6,820 sq.yd. Walnut St., $54,080—vibrolithic concrete paving 4,460 sq.yd. Withers St., $21,920—rein.-con. paving 4,605 sq.yd. Armstrong St. $24,040—1,800 sq.yd. Kingshighway, $9,360—0.055 sq.yd. Hampton St. $32,200—1,660 sq.yd. Southwest Ave. $14,600. W. W. Horner, City Hall, engr.

Mo., St. Louis—Stedelin Bros., 823 North 4th St., taking bids grading 200,000 cu.yd. west of Kingshighway.

Nebraska—July 11, by State Dpt. P. Wks., State House, Lincoln, grading 102.1 mi., concrete paving 47.1 mi., graveling 283.3 mi., bridging roads throughout state. R. L. Cochran, state hy. engr.

N. J., New Brunswick—July 5, by Bd. Freeholders Middlesex Co., Court House, concrete paving 13,632 ft. Perth Amboy-Metuchen Rd. W. F. Buchanan, Perth Amboy, engr.

N. J., Newton—July 16, by Bd. Freeholders Sussex Co., Court House, constructing Swartswood Myrtle Grove Rd., Hampton Twp. H. Snook, Newton, co. engr.

N. J., Union—July 9, by Twp. Com., Town Hall, curbing, 7 in. single line rein.-con. paving Tyler St., Barbara, Kay, Morrison, Stecher, Orange and Isabella Aves. $108,000. H. Kreh, Jr., Falls Bldg., town engr.

N. J., West New York — Bd. Boro Council, Bldg., will take new bids bituminous concrete paving 13th St. $34,000. Former contract rescinded. Noted June 28.

New York—July 9, by A. W. Brandt, comr. Hys., State P. Wks. Bldg., Albany, constructing, reconstructing, bridging hys. in Monroe, Sullivan, Albany, Herkimer, Livingston, Oneida, Orange, Oswego, Tioga and Erie Counties; adv. E. N.-R. July 4.

N. Y., Brooklyn — July 10, by J. J. Byrne, pres. Brooklyn Boro, Boro Hall, grading, curbing, flagging Avenue X, Albany, Gardner Aves., East 89th, Knapp and West 2nd Sts.—sidewalks on New Lott Ave.—shaping, rolling, bituminous concrete surfacing Church Lane, Avenue L, East 95th, East 96th, Remsen and Seaview Aves.—grading, curbing, flagging, sheet asphalt on 6 in. court paving Quentin Rd., Avenue P, Walsh Court, Coney Island, Conklin and 11th Aves., Bristol, East 2nd, East 3rd, East 8th, East 21st, East 26th, East 40th, East 46th, East 49th, East 52nd, East 53rd, East 98th, East 93rd, West 8th, West 10th, 36th, 53rd and 64th Sts.

N. Y., New York — July 9, by H. Bruckner, pres. Bronx Boro, Crotona Park, 3rd and Tremont Aves., granite block on concrete repaving West 170th and Exterior Sts.; grading, curbing, sidewalks East 224th St. and Wilson Ave.

O., Canton—July 12, by Comrs. Stark Co., improving 1.43 mi. Breuster-Justus Rd. $43,863—paving 4.5 mi. Canton-Magnolia Rd., brick $75,862, concrete $68,137—brick paving 1 mi. Lincoln Hy. $137,378. A. W. Wise, Canton, engr.

O., Columbus—July 10, by Comrs. Franklin Co., F. L. Donnalley, clk., bituminous macadam paving 0.663 mi. 4 roads. $26,291.

Pennsylvania—July 18 and 19, by State Hy. Comn., Harrisburg, rein.-con., vitr. brick paving 35 mi. 19 projects in Allegheny, Centre, Clarion, Clearfield, Delaware, Elk, Fayette, Jefferson, Lackawanna, Lawrence, Tioga, Somerset and Washington Counties. J. L. Stuart, secy.; adv. E. N.-R. July 4.

Tennessee—Aug. 2 and 9 (tentative bids), grading 8 mi. Putnam Co. Line Rd., Cumberland Co.—14 mi. Grand Vire-Grassy Cove Rd., Rhea and Cumberland Counties—7.2 mi. Moss-Celina Rd., Clay Co.—2.2 mi. bridge approach at Dover, Stuart Co.—13.5 mi. Boliver-Madison Co. line Rd., Hardeman Co.—10.3 mi. Dresden-Palmersville Rd., and 7.5 mi. Palmersville-Kentucky State line Rd., Weakley Co.—8.2 mi. Altamont-Viola Rd., Grundy Co.—3.4 mi. Marion Co. line-Southern Underpass Rd., Hamilton Co.—9.7 mi. Crossville Rd., Cumberland Co.—3.5 mi. Manchester Warren Co. line Rd., Coffee Co.—8 mi. Celina-Kentucky State Line Rd., Clay Co.—7 mi. Wanesboro-Sol Hollow Rd., Wayne Co.—8.2 mi. Mason-Covington Rd., Tipton Co.—Harrahan Bridge underpasses, approaches, Shelby Co.—paving 3.5 mi. Tennessee-Alabama State line Rd., Marion Co.—11.8 mi. Waynesboro-Lawrence Co. line Rd., Wayne Co.—15.4 mi. Wayne Co. line-Lawrenceburg Rd., and 8 mi. Lawrenceburg-Giles Co. line Rd. Lawrence Co.—8 mi. Lawrence Co. line-Pulaski Rd., Giles Co.—11 mi. Bolivar-McNairy Co. line Rd., Hardeman Co.—10.5 mi. Hardeman Co. line-Selmer Rd., McNairy Co.—0.75 mi. Bachman Tunnel, Hamilton Co.—2.5 mi. Nolensville Pike, Davidson Co.—5 mi. Crum-Tennessee River Rd., Hardin Co.—10 mi. Crockett Co. line-Fowlkes Rd., Dyer Co.—3.9 mi. Brownsville Rd., Haywood Co.—1 mi. Scott Ave. and 8.5 mi. Memphis Route 4, Shelby Co. To exceed $3,000,000. R. H. Baker, comr.

Tex., Amarillo—July 16, by City, W. N. Durham, city mgr., various types paving 1 mi. 36th St. from Harrison St. to city limits. E. N. Stanley, City Hall, engr.

Tex., Marlin—July 16, by W. F. Turner, aud. Falls Co., 2½ in. vertical fibre brick on 5 in. concrete, 2 in. limestone rock asphalt (hot mix) on 5 in. concrete, 2 in. warrenite bitulithic wearing surface on 5 in. concrete or 6 in. rein.-con. paving 8,489 sq.yd.

Utah, Salt Lake City—July 16, by City Comn., concrete paving 28,100 sq.yd. 17th St. $110,845. H. Jessen, city engr.

Vermont—July 5, by State Hy. Bd., Montpelier, bituminous macadam paving 2.5 mi. hy. in Ryegate.

Virginia—July 16, at office Dpt. Hys., Richmond, grading 5.6 mi. Project S523DEB1, York Co.—10.5 mi. Project S559FG, King William Co.—sheet asphalt paving 1.3 mi. Project S576A, Arlington Co.—asphalt paving 3 mi. Project F577A, Pittsylvania Co.—macadam paving 3.7 mi. Project F581A, Clarke Co.—0.8 mi. and bridge Project F589A, Frederick Co.—bridge Project S294G, Rappahannock Co.; adv. E. N.-R. July 4. $315,000.

Va., Princess Anne—July 9, at office Clerk Princess Anne Co., waterbound macadam paving 26.116 mi. 10 projects—bituminous macadam paving 3.297 mi. 2 projects—traffic bound macadam paving 2 mi. 1 project. L. O. Hines, Princess Anne, co. engr.

Wash., Colfax—July 15, by Comrs. Whitman Co., grading, crushed rock surfacing 6.2 mi. Pullman Hy., Permanent Hy. 2. L. R. Sampson, Colfax, engr.

Wash., Seattle—July 15, by Comrs. King Co., concrete paving 1.7 mi. Lake Burien-Three Tree Point Rd., 20 ft. $77,000; 2.61 mi. Enatie-Roanoke Hy., 20 ft. $100,000. T. Hunt, Seattle, engr.

West Virginia—July 10, by Court Kanawha Co., Charleston, grading, 1¼ mi. Project 176—approach fills for Patrick Street bridge over Kanawha River, Project 3427-B—steel superstructure Blue Creek Bridge, Project 222-A—Allens Fork Bridge, Project 226-A—8 stone, concrete box culverts, Project 228-A—2 stone, concrete box culverts, Project 166-A—2 concrete box culverts, retaining wall, Project 143-C.

Wisconsin—July 6, by State and Green Co. Hy. Comns., Monroe, crushed stone or gravel-ing 12,000 cu.yd. S.T.H. 59—2,500 cu.yd. Town of Sylvester Rd.—graveling 4 mi. S.T.H. 92—2,500 cu.yd. Township of Brooklyn Rd. J. C. Jones, div. engr.

Ont., Hamilton—See "Contracts Awarded."

Contracts Awarded

Alabama—State Hy. Com., Montgomery, 7 in. concrete paving 6.44 mi. hy., to Couch Constr. Co., Dothan, $133,842—14.9 mi. hy. between Axis and Calvert and several small concrete bridges on same road, to Morgan-Hill Paving Co., Woodward Bldg., Birmingham, $347,206 and $16,345 respectively, all foregoing in Mobile Co.—7 in. concrete paving 16.2 mi. Tuscaloosa Co., to Davis Constr. Co., Atlanta, Ga., $199,138—1½ mi. Tuscaloosa Co., to Jones Rast and Griffith, American Traders Bldg., Birmingham, $11,812—4 in. slag surfacing 1½ mi. Etowah Co., to Shruptine Constr. Co., American Traders Bldg., Birmingham, $6,456—¼ mi. earth approaches to river bridge at Gainesville, Greene and Sumter Counties, to Hooper Constr. Co., Bunnell, Fla., $21,080—several small concrete bridges on same road, to J. T. McLemore, Eutaw—¼ mi. earth approaches to bridge, Cherokee Co., to R. H. Edwards, Sylacauga, $26,579; several small concrete bridges on same road, to R. H. Lowe, Center, $8,313—¼ mi. earth approaches to Cochran Bridge, Pickens Co., to H. R. Donahoo, 510 North 21st St., Birmingham, $24,151—several small concrete bridges between Centerville and Perry Co. line, Bibb Co., to C. B. Cox, Clanton, $2,571—Grove Hill and Jackson, Clarke Co., to Frost Constr. Co., Montgomery, $5,534. Grand total $803,027. Noted June 6.

Ala., Birmingham—City Com., to Independent Paving Co., 3828 1st Ave. S., 5 in. concrete paving 1 block 79th Pl., $2,297; 2 blocks 86th St. $5,126; grading, curbing, guttering, sidewalks, 2 in. asphalt on 6 in. concrete paving 1 block 2nd Ave. S., $6,270—to Walter J. Bryson Paving Co., Watts Bldg., 4 blocks 75th St., 5th and 43rd Aves., $24,380—to Wesco Co., 4501 2nd Ave., grading, curbing, guttering, sewers, 2 in. asphalt on 6 in. concrete paving 1 block 4th Ave. S., $9,434—to Mitchell Bros. Constr. Co., American Traders Bldg., 2 in. asphalt on 6 in. concrete paving 5 blocks 44th St. and 46th St., Ensley, $22,536—to East Lake Independent Paving Co., American-Traders Bldg., 2 in. asphalt on 5 in. concrete paving 1 block 7th Ave. S., $3,439—to Dunn Constr. Co., Lincoln Life Bldg., 2½ in. asphalt paving 1 block Alabama Ave., $2,876—to Southern Roads Constr. Co., Pioneer Bldg., asphalt resurfacing 1 block 39th St. and 7th Ave., $1,385—to Reliance Concrete Co., Comer Bldg., 5 in. concrete paving 1 block 17th Alley, Ensley, $550; 6 in. concrete paving 1 block 5th Alley S., $1,640. Grand total $79,933. Noted May 30.

Arkansas—State Hy. Comn., Little Rock, to W. P. McGeorge & Co., Pine Bluff, grading 10.5 mi. Stone Co. $73,141; grading, graveling 17.5 mi. Fulton and Sharp Counties $107,981—to Ayers & Graves, Hope, 11 mi. Jefferson Co. $49,890; 9.5 mi. Jefferson and Lincoln Counties $29,648; 11 mi. Poinsett Co. $40,118—to I. S. Cole, Fayetteville, 8.5 mi. Benton Co. $41,298—to Reynolds & Sutton, Nashville, 12 mi. Hempstead Co. $106,093—to Horton Price Constr. Co., Texarkana, 9 mi. White and Woodruff Counties $173,330—to Callahan Walker Constr. Co., Omaha, Neb., 2 mi. Woodruff Co. $65,681—to Interstate Constr. Co., Ft. Smith, 9.5 mi. Montgomery Co. $41,298—to J. N. George & Bros., Centerville, 7 mi. Yell Co. $42,669—to G. W. Nickels & Son, Hot Springs, 11 mi. Yell Co. $69,815—to Forcum James Co., Dyersburg, Tenn., 5 mi. Lawrence and Greene Counties $35,451—to E. A. Luck, Perryville, 8.5 mi. Randolph Co. $49,970—to Bunnell & Mack, Paragould, 13 mi. Craighead Co. $47,161—to Ellis & Lewis, Little Rock, 9 mi. Pulaski Co. $59,781; graveling 13.61 mi. Madison Co. $23,768—to Gravelle & Hamblin, Muskogee, Okla., grading, graveling, 9 mi. Carroll Co. $113,693—to L. A. Lemon, Booneville, 5.5 mi. Logan Co. $36,805—to R. M. Robinson, Owensboro, Ky., graveling 11 mi. Clay Co. $44,285—to A. C. Kennedy, Little Rock, 8 mi. Clay and Greene Counties $30,277—to G. C. Smith & B. B. Mooney, Hot Springs, 10 mi. Garland Co. $20,959—to T. L. Thogmartin & Son, Ft. Scott, Kan., gravel and crushed stone surfacing 12.5 mi. White and Jackson Counties $38,998—to M. O. Weaver, Iowa Falls, Ia., crushed stone or shale surfacing 20 mi. Faulkner Co. $123,805—to R. J. Lynch & Co., Little Rock, grading 12 mi., concrete paving 11 mi. Crittenden Co. $378,520—to McGuire & Cavender, Texarkana, grading, concrete paving 1.5 mi. Miller Co. $327,740—to J. P. McNulty, Pine Bluff, 5 mi. Jefferson Co. $115,945—to Hartman-Clark Bros. Co., Peoria, Ill., 1.5 Union Co. $41,024—to Newell Constr. Co., Little Rock, grading 10.5 mi. Lonoke Co. $71,170; grading, graveling 5 mi. Craighead Co. $50,876; crushed stone surfacing 18 mi. Van Buren Co. $49,836; concrete paving 2 mi. Crittenden Co. $50,178—to Hogan Constr. Co., Little Rock, asphalt paving 14 mi. Crittenden Co. $269,521. Grand total $2,820,725. Noted June 13.

California — State Hy. Comn., Sacramento, produce and stock pile screenings 22.1 mi. Del Norte Co., to Holdner Constr. Co., 2608 R St., Sacramento, $14,125. Noted May 23.

Calif., Los Angeles—Grading, curbing, guttering, walks, 8 in. concrete paving 281,243 sq.ft. Fountain and Myra Ave., Impvt. Dist. to McCray Co., 4482 East Worth St., $106,587. Est. $110,480.

Calif., Santa Ana—Supervs. Orange Co., grading, graveling 16 mi. streets at Yorba Linda, to Bruce Bros., Huntington Beach, $83,750.

Colo., Grand Junction—H. C. Niles, city clk., warrenite bitulithic on concrete paving, to New Mexico Constr. Co., Box 1770, Denver, $71,704.

Idaho—State Hy. Com., Boise, to Johnson-DeAtley, Lewiston, constructing 5.56 mi. Lewis Co. $8,416; grading, crushed rock surfacing 11.94 mi. Elkton River Extension $24,574; 3.0 mi. Latah Co. $23,073—to Earl & Jess Ratcliff, Bonners Ferry, clearing 7.853 mi. Boundary Co. $5,390. Grand total $61,453.

Ill., Decatur—Widening, asphalt on brick resurfacing 8 blocks South Oakland Ave., 36 ft., to Birt & Driscoll, Citizens Bank Bldg., Decatur, $39,045.

Ill., Peoria—Bd. Local Impvts., grading, curbing, rein.-con. paving 6 blocks Maywood and Melbourne Aves., 30 ft., to E. Lehmann Co., Lehmann Bldg., $26,414 est. $28,069—7 blocks Forest Hill Ave. and Doublet Court, 30 ft., to McElwee & Rogy, 826 South Adams St., $29,913 est. $35,403.

Indiana—State Hy. Dpt., Indianapolis, concrete paving 1.534 mi. Project 192, Clinton Co., to A. F. Adams, Clinton, $32,766 est. $37,410—10.224 mi. Project 160a, White Co., to Dunzweiler Constr. Co., Zanesville, O., $171,486, est. $194,112—grading, structures 2.844 mi. Project 153, Ripley Co., to Hodgkins & Adams, Winchester, Ky., $132,402, est. $144,386. Grand total $336,654.

Ind., Anderson—Madison Co., concrete paving 8 1/3 mi. Pendleton-Lafel Rd., to Hinton & Smalley, Celina, O., $218,436 est. $250,000; 2 mi. Hamilton Rd., to Daniels Lyst & McVaugh, Anderson, $47,241 est. $50,000. Noted June 6.

Ia., Sioux City—Woodbury Co., grading 5.48 mi. road, to G. W. Condon, 415 Farnum St., Omaha, Neb., $28,077; 5 culverts, to Moville Constr. Co., Moville, $2,580.

Kan., Lawrence—Grading, concrete paving, to M. N. Penny Co., Lawrence, $13,521; asphalt paving, to Kaw Paving Co., 100 Topeka Ave., Topeka, $21,042.

Kentucky—State Hy. Dpt., Frankfort, improving 6.081 mi. Arlington-Milburn Rd., Flood Project 9, Carlisle Co., to Frazure & Cocke, Paducah, $55,228. Noted Mar. 28.

Louisiana — State Hy. Comn., Baton Rouge, to Meyer-Greenwald Constr. Co., Monroe, washed gravel surfacing 4.33 mi., $32,909—to J. McKeithen Grayson, 5.62 mi. $34,955; 7.95 mi. $80,131; Project 453-A, $32,414, all foregoing in Caldwell Parish—to J. C. Leathers, Atlanta, Ga., 9.38 mi. Allen Parish, $40,503—to Standard Hys. Co., Hammond, 5.64 mi. Washington Parish, $46,167—to W. Junkins, Natchez, Miss., reef shell surfacing 11.078 mi. Lafourche Parish, $92,956—to Harvey & Jones, Jonesboro, local iron ore and crushed rock surfacing 7.098 mi. Union Parish, $54,288. Grand total $420,323. Noted May 16.

Maryland — State Roads Comn., Baltimore, graveling 3.3 mi. Contr. P-92, Prince George Co., to J. B. Wyvill, Upper Marlboro, $31,307; concrete paving 0.98 mi. Contr. Ho-51, Howard Co., to Christhilf & Ensey Co., 1625 Ridgely St., Baltimore, $17,911. Noted May 30 and June 6.

Md., Baltimore—Bd. Awards, grading 38,000 sq.yd. Contr. 525, to W. F. Huse, 2800 Montebello Terrace, $26,185; sheet asphalt paving 11,350 sq.yd. Contr. 524, to Baltimore Asphalt Block & Tile Co., 1320 North Monroe St., $49,192; concrete paving 13,250 sq.yd. Contr. 523, to Arundel Contg. Co., Knickerbocker Bldg., $34,139. Grand total $109,516. Noted June 6.

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Streets and Roads (Continued)

Massachusetts—Dpt. P. Wks., Boston, gravel and bituminous macadam paving 5,000 ft. hy. in Carlisle, to Lawton Constr. Co., 250 Gallatin St., Providence, R. I., $16,202—bituminous macadam paving 8,582 ft. Greenfield, to Kelleher Corp., Turners Falls, $53,072—2,600 ft. Holden, to Marioise Sand & Gravel Co., 8 Wall St., Worcester, $13,835—2,450 ft. Westwood, to Hudson Constr. Co., 137 Kay St., Newport, R. I., $6,619. Grand total $89,728. Noted June 13.

Mass., Boston—Dpt. P. Wks., sheet asphalt or bitulithic paving East and West Canton Sts., to C. M. Callahan, Inc., 23 South Fairview St., Roslindale, $27,493. Noted June 13.

Mass., Boston—Sheet asphalt paving Sumner St., Ward 1, to S. J. Tomasello, 41 Arborway, Jamaica Plain, $30,310—Ashton St., Ward 14, to Appel & O'Toole, 78 Moreland St., Roxbury, est. $25,000—granite block paving D St., South Boston, Ward 6, to A. DeStefano & Sons, Inc., 288 Summer St., $17,903.

Michigan—State Hy. Dpt. Lansing, concrete paving 19.375 mi. MO82-27, C-1, 10 ft., Wayne Co., to Wayne Co. Road Comn., Telegraph Rd., Detroit, $361,270.

Miss., Winona—Montgomery Co., graveling roads, to Williamson Bros., Water Valley, Miss. —Duck Hill-Alva Rd., incl. 7,500 cu.yd. gravel, 100,900 units overhaul, to Lynn Gravel Co., Avalon, Winona-Huntsville Rd., incl. 11,750 cu.yd. gravel, 131,000 units overhaul, to Waters & McCreary, Columbus. Noted May 30.

Mo., Clayton—Rein.-con. paving 15,910 sq. yd. (north side city's share), Clayton Rd., to C. M. Berry Constr. Co., 7370 Manchester Ave., Maplewood, $55,939. Noted Mar. 28.

Mo., Clayton—St. Louis Co. Court, Court House, grading 15,900 cu.yd. Fox Creek Rd., to J. Moss, 1908 North and South Rd., Brentwood, $24,356; rein.-con. paving 11,600 sq.yd. Hanley Rd., to H. B. Dawson, 6734 Scanlon Ave., St. Louis, $45,364.

Mo., Kansas City — Concrete paving Independence Ave. between Elwood and Hardesty Sts., to T. P. Thompson, 3908 Forest Ave. $43,019—Independence Ave. between Cleveland and Elmwood Aves., to McTernan-Halpin Constr. Co., Swope Parkway and South Benton St. $43,798 —Independence Ave. between Benton Blvd. and Cleveland St., to J. O. Patterson, 1615 Main St., $31,728—Bway. between 6th and 12th Sts., to Midwest Paving Co., 25th and Summitt Sts. $33,506. Grand total $152,051.

Mo., St. Louis—Bd. P. Serv., City Hall, 4 in. granite block repaving Newstead Ave. between Clayton and Duncan Sts., and vibrolithic concrete paving 2,165 sq.yd., Spring Ave., to Perkinson Bros., 3237 Carter Ave., $31,385 and $12,867 respectively — vibrolithic concrete paving 2,060 sq.yd. Rosalie St. and 1,980 sq.yd. Lloyd St., to William A. Riley Constr. Co., 110 North 7th St., $14,325 and $12,045 respectively —rein.-con. paving 2,495 sq.yd. Knox Ave. and concrete paving 910 sq.yd. Parker Ave., to Creech Constr. Co., 5619 Natural Bridge Ave., $13,373 and $5,329 respectively — rein.-con. paving 16,310 sq.yd. Hampton Ave., to Eyermann Constr. Co., 1210 South Grand Blvd., $46,746. Grand total $136,070. Noted June 6.

New Jersey—State Hy. Comn., Trenton, grading 9 in. rein.-con. paving road in Passaic Co., to G. M. Brewster & Son, 253 West Fort Lee Rd., Bogota, $198,362. Noted June 14.

New Jersey—State Hy. Comn., Trenton, grading, paving road in Union Co., to C. H. Winans, 205 Broad St., Elizabeth, $164,792; in Camden and Burlington Counties, to S. J. Groves, Ridgefield Park, $549,150. Noted June 6.

N. J., Fair Lawn—Bd. Boro. Council, Boro Hall, grading, curbing, paving 2nd and Highview Aves., to Harper Bros., 162 Beach St., Hackensack, $44,932.

N. J., Moonachie (mail Carlstadt)—Bd. Boro Council, Boro Hall, Tarvia B surfacing, to C. C. Job, 24 Union Ave., Little Ferry. Est. $25,000. Noted May 30.

N. J., Saddle River—Twp. Comn., Lincoln School, grading, sidewalks, curbing Victor St. and Scholes Ave., to Rochelle Park Constr. Co., Rochelle Park, $11,208; curbing, sidewalks, 7 in. asphalt bound macadam paving Bella Vista Ave., 2nd, 3rd and 10th Sts., to Midland Constr. & Contg. Co., Rochelle Park, $10,733. Noted June 6.

N. J., Woodbury—Bd. Freeholders Gloucester Co., Court House, improving sections Woodbury-Auburn Rd. and Clayton-Williamstown Rd., to C. D. Prosser, Pitman, $47,687.

N. Y., Brooklyn—J. J. Byrne, pres., Brooklyn Boro, Boro Hall, to B. Turecamo Contg. Co., New Cropsey Lane, asphalt paving Church Ave., $26,533; Nostrand Ave. $46,568; West 6th St. $10,529; West 7th St. $9,522; 61st St. $6,659 —to Brooklyn Alcatraz Asphalt Co., 407 Hamilton Ave., Bergen Pl. $2,489; Bradford Ave. $8,565; grading Warwick St. $1,769—to M. J. O'Hara, Neptune Ave. and West 19th St., Avenue U, $13,230—to W. J. McHale Contg. Co., 1250 Jefferson Ave., Avenue V $1,724; West 2nd St. $4,436—to Grimm Contg. Co., 170 McKinley Pl., 59th St. $4,555—to Persicano Constr. Co., 480 Lenox Rd., 96th St. $1,916. Grand total $138,495. Noted June 6.

N. Y., Brooklyn—J. J. Byrne, pres. Brooklyn Boro Boro Hall, to Brooklyn Alcatraz Asphalt Co., 407 Hamilton Ave., asphalt paving Atlantic Ave., $10,896; East New York Ave., $61,723; Sutter Ave., $72,667; Troy Ave., $9,190; 6th Ave. $23,125; 23rd Ave. $5,451—to M. G. M. Building Contg. Co., Avenue W $1,742; grading Bay 10th St. $3,060; East 29th St., $1,056—to C. R. Contg. Co., 2266 Gravesend Ave., Cortelyou Rd., $4,465. Grand total $193,375. Noted June 13.

North Carolina — State Hy. Com., Raleigh, grading, concrete paving 1.65 mi. Forsyth Co., and grading, asphaltic concrete paving 4.19 mi. Warren Co., to Powell Paving Co., Inc., Winston-Salem, $34,895 and $62,021 respectively—14 mi. Onslow Co., to West Constr. Co., Chattanooga, Tenn., $119,070—grading, concrete or asphalt paving 1.66 mi. Buncombe Co., to Wilson Constr. Co., Asheville, $38,809—clearing, grading, topsoiling 9.46 mi. Nash Co., to Lavender Bros., Earl, $57,500—clearing, grubbing, grading, topsoiling 9.14 mi. Davidson Co., to Hendricks & Kennedy, Com. Bank Bldg., Charlotte, $74,899—grading, clearing, topsoiling and small rein.-con. structures 4.08 mi. Halifax Co., to Beal Bros., Bear Creek, $29,490 —1.27 mi. Nash Co., to R. G. Lassiter & Co., Raleigh, $29,669—grading, gravel surfacing 4.58 mi. Durham Co., to C. A. Ragland, Louisburg, $38,918. Grand total $485,271. Noted May 9 and 16.

O., Akron—F. E. Swineford, dir. P. Wks., Trinidad asphalt paving 29,000 sq.yd. Martha and Seiberling Sts., to Columbia Asphalt Paving Co., 304 Buckeye Bldg., $158,238—concrete limestone paving 7,950 sq.yd. LaSalle St. et al., to McAlonan Bros., 506 Woodland Ave., $39,223—3½ in. brick paving 5,130 sq.yd. North Forge St., to P. S. Maline, 52 Hoover St., $30,522. Grand total $227,983. Noted June 6.

O., Cincinnati — Hamilton Co., concrete repaving 2,800 sq.yd. North Bend Rd., to E. A. Freshwater & Sons, Hazen Bldg., $87,213. Est. $114,983. Noted May 30.

O., Cleveland—Brick paving Fischer Rd., and asphalt paving East 126th St., to Highway Constr. Co., Terminal Tower, $32,592 and $4,642 respectively—brick paving West 63rd St. and oil asphalt paving West 152nd St., to Rochi Bros., 7002 Denison Ave., $3,230 and $15,679 respectively—Hilland Ave., West 60th and West 61st Sts., and brick paving West 58th St., to Baldwin Bros., Union Trust Bldg., $45,444 and $23,672 respectively. Grand total $125,259.

O., Columbus—W. H. Duffy, dir. Serv., 8,940 sq.yd. asphalt paving Miller Ave., to A. W. Burns Constr. Co., 424 Woodland Ave., $26,575. Noted June 13.

O., Dayton—Montgomery Co., rein.-con. and vibrolithic concrete paving Kohler Ave., to W. I. Anderson, Troy Pike, $16,154 — Edison and Osmond Aves., to E. C. Adams, 46 Fern Ave., $52,850—King and Chelsea Aves., to Finke Eng. Co., Realty Bldg., $31,025 — Holloway St., to W. S. Little, Everett Dr., $9,283—Lyndhurst Ave., to C. Crampton, R. R. 5, $4,543. Grand total $113,855.

O., Parma (br. Cleveland)—Village, sheet asphalt paving Evergreen and Manorford Drives, also concrete paving Brownfield Dr., to Loesch & Green Constr. Co., Ridge Rd., Cleveland, $83,944—Yorkshire Ave., to F. W. Stollfus, Western Reserve Bldg., Cleveland, $40,429—bituminous concrete paving Luelda and Torrington Aves., to Baldwin Bros., Union Trust Bldg., Cleveland, $29,611. Grand total $153,984. Noted June 6.

O., Warrensville Heights (br. Cleveland) — Bitulithic concrete paving 4 streets and concrete paving 1 street, to Cleveland Trinidad Paving Co., Western Reserve Bldg., $104,005 and $26,461 respectively. Noted May 16.

Pennsylvania—State Hy. Comn., Harrisburg, rein.-con. paving 7,212 ft. Delaware Co., to Dalton Bros., Inc., Paoli $55,918—30,650 sq.yd. Beaver Co., to Keystone Constr. Co., Keystone Bldg., Pittsburgh $243,699 — concrete paving 40,200 sq.yd. Erie Co., to L. V. Metz Constr. Co., Erie $169,674—18,500 sq.yd. Northumberland Co., to D. W. Davis & Sons, Kingston $81,593—24,000 sq.yd. Allegheny Co., to D. W. Challis, Sewickley $158,662 — 11,500 sq.yd. Washington Co., to T. Arrigo, Charleroi $64,755. Grand total $774,301. Noted May 9.

Pa., Monessen—Brick on 6 in. concrete paving 4,400 sq.yd. Denn Ave., to P. Derinzo, Fayette City. Est. $25,000.

Pa., Phila.—Dpt. P. Wks., Bureau of Hys., A. Murdock, dir., City Hall Annex, asphalt paving (assessment work) Gerhard St., to Municipal Constr. Co., Washington Square Bldg., $8,300—asphalt repaving 17th St. from Norris to Susquehanna Sts., to Eastern Asphalt Co., Penn Bldg., $20,500. Noted June 6.

Tenn., Chattanooga — Curbing, sidewalks, Ward 12, to W. F. Holmes Co., Chattanooga, $72,000.

Virginia — Dpt. Hys., Richmond, grading 0.378 mi. Scott Co., to B. H. Crizer, Appalachia, $8,730—bituminous paving 2.153 mi. Pulaski Co., to Southern Asphalt Co., Richmond, $4,109 —bridge over Whiskey Creek, Augusta Co., to T. J. Haymes, Salem, $8,020—furnishing, hauling stone 8.14 mi. Scott Co., to M. T. McArthur, Johnson City, Tenn., $36,300. Grand total $57,159. Noted May 30.

Washington—State Hy. Comn., Olympia, grading 154,000 cu.yd. Skamania Co., and crushed stone surfacing 53,000 cu.yd. Benton Co., to Wren & Greenough, 1027 Chamber of Commerce Bldg., Portland, Ore. $110,343 and $80,716 respectively—34,000 cu.yd. Kittitas Co., to H. G. Johnson, Cle Elum $62,090—grading 28,000 cu.yd., concrete paving, 138,000 sq.yd. Spokane Co., to J. H. Collins & Co., P. O. Box 56, Spokane, $360,007. Grand total $613,156. Noted May 23.

Wash., Olympia—Capitol Comn., grading, paving 22,700 sq.yd. Capitol Grounds, to C. L. Creelman, 1079 25th St. N., Seattle, $199,130. Est. $225,000.

W. Va., Huntington—Bd. Park Comrs., asphalt paving Washington Blvd., to Andrews Asphalt Paving Co., Hamilton, O., $41,150.

Wisconsin—State and Buffalo, La Crosse and Vernon Counties, Court House, La Crosse, grading 1.67 mi. Project 5150, to Patzkill & Graber, Mineral Point, $20,356—crushed stone surfacing 3,563 cu.yd. same road, to Iowa County Constr. Co., Cobb, $8,231—grading 3.61 mi. Project 5146, Vernon Co., to Southern Wisconsin Road Constr. Co., Madison, $34,051 —crushed stone surfacing 7,496 cu.yd. same road, to E. Muller, La Farge, $16,116—shale surfacing 4,237 cu.yd. Project 5080, Buffalo Co., to Badger Stone Co., Fountain City, $10,108. Grand total $72,746.

Wis., Milwaukee—Milwaukee Co. Hy. Comn., badger resurfacing 33,000 sq.yd. Silver Springs Rd., to Parkinson Constr. Co., 322 27th St., $78,212—18,000 sq.yd. Loomis Rd., to Badger Constr. Co., 97 East Wisconsin Ave., $57,014 —32,000 sq.yd. Watertown Rd., to White Constr. Co., 68 East Wisconsin Ave., $63,680—12,000 sq.yd. Chicago Rd., to J. P. Humphreys, 735 Downer St., $17,184. Grand total $216,090.

Ont., Fort William—A. McNaughton, City Hall, bitulithic on concrete paving 40,000 sq.yd., to Warren Bituminous Paving Co., 54 University Ave., Toronto. Est. $125,000. Noted May 30.

Ont., Hamilton—City Council, concrete paving 5 mi. Mountain Dr., 40 to 60 ft., day labor, under supervision W. McFaul, city engr. $327,000. Noted Mar. 28.

Ont., Millbrook — Durham and Northumberland Counties (Cobourg) bituminous macadam paving 3½ mi. roads, to Dufferin Constr. Co. Ltd., foot Bathurst St., Toronto, $73,000. Est. $75,000.

Ont., Sandwich — Concrete paving, to S. P. West, 51 Victoria St., $50,000.

Ont., Toronto—City Council, asphalt paving Church St., Sect. A, to Godson Contg. Co., 203 Richmond St. W., $18,898—Sects. B, and C, to Raynor Constr. Co., Commerce and Transportation Bldg., $43,478—Sects. D and E, to Kilmer & Barber, 10 Adelaide St. E., $44,558. Grand total $106,934.

Public Bond Elections

Coming Bond Elections

Waterworks—Clinton, Okla., July 15. $600,000.
Waterworks—Seminole, Okla., July 16. $17,500.
Waterworks Extension and Sewerage System—Midlothian, Tex., July 16. $65,000.
Sewer Extension, Watermains, etc.—Easton, Md., $40,000.
Sewerage System—Pasadena, Tex., $50,000.
Airport—Seminole, Okla., July 16. $30,000.
High School—Lubbock, Tex., July 9, $650,000.

Bonds Voted

Waterworks — Pasadena, Calif., Pine Canyon Dam Project, $10,000,000.
Waterworks—Aberdeen, S. D., $145,000.
Sewage Disposal Plant—Albion, N. Y., $50,000.
Sewage Disposal Plant—Maud, Okla., $25,000. Long & Co., Oklahoma City, Engrs.
Sewerage System—Richmond, Tex., $50,000.
Bridges — Beaumont, Jefferson County, Tex., $198,000. County portion. B. B. Johnson, Co. Judge.
Roads—Black Hawk County, Ia., $1,000,000.
Roads—Cass County, Ia., $1,500,000.
Roads—Lauderdale County, Miss., $800,000.

Buildings—Industrial

Proposed Work

Conn., Bridgeport—MILL—Bridgeport Brass Co., C. E. Beardsley, pres., East Main St., brass rolling mill. $1,000,000 or more.

Conn., Bridgeport—SERVICE—Model Tire Co., 322 Fairfield Ave., H. J. Platt, service building, John St. and Fairfield Ave. $100,000. Private plans.

Idaho, Lewiston—HYDRO-ELECTRIC PLANT —Idaho Power Co., 7th and Bannock Sts., Boise, does not contemplate hydro-electric plant on Snake River, near here. $600,000. This corrects report in June 13 issue.

Ill., Rockford—FACTORY and OFFICE—G. D. Roper Corp. plans by F. D. Chase, Inc., Black Hawk Bldg., factory and office building. $75,000.

Mass., Framingham—SERVICE GARAGE and REPAIR SHOP—Noyes-Buick Sales Co., 857 Commonwealth Ave., Boston, 1 story, probably brick, steel, 100 Pearl St. $50,000. Private plans.

Mass., South Boston (Sta. Boston)—FACTORY—Old Colony Plating Co., 135 Old Colony Ave., additions and alterations. Private plans.

Mass., Springfield — SERVICE STATION — Norton Tire Stores, Inc., C. L. Norton, 50 Hillman St., plans by R. M. Mowry, 25 Harrison Ave., 1 story, 90 x 95 ft., brick, Westminster and State Sts. $45,000.

Mass., Taunton—FACTORY—North Dighton Stove Co., 1 Railroad Ave., H. H. Lincoln, pres., rebuilding brick, steel plant, Railroad Ave., recently destroyed by fire. $100,000. Private plans. Noted June 20.

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Buildings—Industrial (Continued)

Minn., St. Paul.—ROUND HOUSE—Northern Pacific Ry. Co., B. Blum, ch. engr., Ry. Exch. Bldg., rein.-con., brick addition, Mississippi and York Sts. $40,000.

N. J., Bloomfield—FACTORY—C. A. Mehurin, 626 East 19th St., New York, will not alter and build 1 story, 70 x 150 ft., brick, steel addition, plain found., Watsessing Ave. $40,000. Project abandoned. Noted Mar. 28.

N. Y., Astoria (sta. Long Island City) — SERVICE GARAGE—J. Goldberg, 1255 Park Pl., Brooklyn, plans by Cohn Bros., 363 Stone Ave., Brooklyn, 1 story, 87 x 134 ft., brick, concrete, Goodrich St. and Astoria Ave. $40,000.

N. Y., Brooklyn—BAKERY—Ebinger Baking Co., W. D. Ebinger, pres., 2209 Bedford Ave., plans by J. E. Hopkins, 41 Park Row, New York, altering 2 story, brick, Snyder and Bedford Aves. $100,000.

N. Y., Brooklyn — BOILER HOUSE and LAUNDRY — Brownsville and East New York Hospital, Avenue A and Rockaway Parkway, plans by E. M. Adelsohn, 26 Court St., 2 story, 66 x 72 ft., brick. $40,000.

N. Y., Brooklyn — GAS STATION and SERVICE GARAGE—Caverly Holding Co., R. Rosenblatt, pres., 1864 80th St., plans by W. T. McCarthy, 147 Pierrepont St., 101 x 101 ft., brick, Fulton St. and Grant Ave. $40,000.

N. Y., Brooklyn — SHOP, GAS STATION, LAUNDRY and GARAGE—Lipo Realty Co., S. Pippoff, pres., 843 Ocean Parkway, plans by I. Kallick, 26 Court St., 1 story building. $40,000.

N. Y., Brooklyn—STORAGE and FACTORY—Royal Show Case Co., 648 Wythe Ave., bids after November, general contract 1½ story, 40 x 100 ft., brick, Ditmars Ave. and East 89th St. $40,000. M. Klein, 65 Court St., archt. Noted May 16.

N. Y., Buffalo—SERVICE STATION and WAREHOUSE—Firestone Tire & Rubber Co., South Main St., plans by Lockwood, Greene & Co., Hanna Bldg., Cleveland, O., 3 story, basement, brick, steel, concrete. $150,000.

N. Y., New York — FACTORY — Superior Fire Proof Door & Sash Co., D. Schaefer, pres., 1811 Carter Ave., plans by H. Ginsberg, 205 West 42nd St., 2 story, 100 x 200 ft., brick, Bates St., from Poplar to Barbour Aves. $150,000.

N. Y., Woodside — SERVICE GARAGES — Realty Associates, 126 Remsen St., Brooklyn, plans by B. Diesler, Jr., 162 Remsen St., Brooklyn, three 100 x 200 ft. garages, Maurice and 53rd Aves. $150,000.

N. C., High Point—FACTORY—J. P. Tate, et al., towel factory, 10,000 to 20,000 towels daily capacity, also manufacture, linen, cotton, silk and rayon fabrics. Total est. $1,000,000.

O., Cleveland—FACTORY—Buckeye Ribbon & Carbon Co., M. F. Donovan, pres., 1450 East 55th St., 1 story, 50 x 140 ft., brick, steel addition. $40,000. Private plans.

O., Niles—PLANT—Empire Steel Co., steel plant. $250,000.

Pa., Phila. — LEATHER PLANT — Ballinger Co., archts., 12th and Chestnut Sts., soon lets contract 2 story, 40 x 110 ft., rein.-con., brick, steel top addition, Orianna and Willow Sts., for Hubschner & Sons. $40,000.

R. I., Providence—FACTORY—Mason Box Co., A. A. Weller, 69 Sprague St., rebuilding brick, Warren St. $40,000 or more. Engineer and architect not selected.

R. I., Woonocket—DYE HOUSE—Florence Dye Wks., 53 South Main St., sketches by W. F. Fontaine, 285 Main St., 1 and 2 story, basement, brick addition, plain found. $40,000.

Tex., San Antonio—COLD STORAGE PLANT —Scobey Cold Storage Co., 315 North Medina St., 7 story, basement, brick, rein.-con., 150,000 sq.ft. storage space, North Medina St., at Missouri-Pacific Ry. tracks. $500,000. Private plans.

Ont., Hamilton—PLANT—Dominion Natural Gas Co., 516 Concenion St., new plant. $2,000,000.

Ont., Toronto—FACTORY—S. Rabinovitch, c/o B. Swartz archt., 336 Dundas St. W., 3 story, 100 x 500 ft., mill, brick, concrete found. $200,000. Excavation awarded to Orsine & Co., 62 Raglan Ave.

Ont., Toronto—SUBSTATION—Toronto Hydro Comn., 226 Yonge St., two 3 story, basement, concrete, brick, steel, one on Yonge St., other on Queen St. E. $1,700,000. Private plans.

Bids Asked

Calif., Los Angeles—FACTORY—See "Contracts Awarded."

Ill., Chicago — FACTORY — July 17, by Graham, Anderson, Probst & White, archts., 80 East Jackson Blvd., 2 story, brick, South Menard and Taylor Sts., for Edison Electrical Appliance Co., Inc., South Menard and Taylor Sts.

Ind., Kokomo—SERVICE and MACHINE SHOP—F. D. Miller, 115½ North Buckeye St., taking bids 1 story, basement, 100 x 204 ft., brick, steel, Buckeye and Superior Sts. $60,000. O. Cook, 622 Armstrong-Landon Bldg., archts.

Md., Baltimore—GARAGE and SALES—July 10, by H. F. Baldwin, archt., 339 St. Paul St., 3 story, basement, 100 x 184 ft., concrete, brick, steel, St. Paul and 24th Sts., for Cunliffe-Cadillac Co., Mt. Royal and Charles Sts. Kubitz & Koenig, Emerson Tower, engrs.

Md., Baltimore—SERVICE—July 8, by F. Thomas, archt., 726 East 33rd St., 1 story, basement, 50 x 200 ft., and 16 x 100 ft., concrete, brick, steel, Lanvale and Morton Sts., for M. J. Barry, Lanvale and Charles Sts. H. F. Doeleman, 516 North Charles St., engr.

Mass., Holyoke — FACTORY — July 6, by Chemical Paper Co., R. Bosworth, 2 story, 60 x 215 ft., and 65 x 107 ft., brick, steel, concrete, Jackson St. $175,000. Private plans. Noted June 27.

Mass., Lowell — DYE HOUSE — See "Contracts Awarded."

Mass., Malden (br. Boston) — SERVICE GARAGE, REPAIR SHOP and SHOWROOM—R. C. Clark, 73 Center St., taking bids 1 story, 60 x 190 ft., brick, stone, steel, plain found., 105-107 Center St. $50,000. C. F. Springall, 50 Park St., Boston, archt. Noted June 27.

Mass., Somerville (br. Boston)—ROUND-HOUSE—Boston & Maine R.R., W. J. Backes, ch. engr., Boston, taking bids 1 and 2 story, concrete, steel roundhouse, terminal, plain found., at terminal yards. $1,500,000. Noted May 2.

Mass., Woburn—SHOWROOM, SERVICE and REPAIR GARAGE—See "Contracts Awarded."

Mich., Detroit—POWER HOUSE—July 8, by C. A. Gadd, bus. mgr. Bd. Educ., 1354 Broadway Ave., 1 story, basement, rein.-con., brick, steel addition, plain found., Linwood Ave. $80,000.

N. J., Linden—PUMP HOUSE, TANKS, GARAGE and OFFICE—Standard Oil Co. of New Jersey, taking bids 1 story, 20 x 30 ft. pump house, 1 story, 120 x 150 ft. garage, brick, rein.-con., plain found., Edgar Rd. Private plans.

N. J., Lodi—FACTORY—Metakloth Co., Inc., Garbaldi Ave., taking bids 1 story, basement, brick, steel, rein.-con. addition, plain found. $40,000. Liebau & Breiby, 238 Main St., Hackensack, archts. Noted July 12.

N. J., Newark—FACTORY and SHOWROOM—E. C. Epple, assoc. archt., 44 Commerce St., Newark, bids about July 15, general contract 3 story, basement, rein.-con., brick, steel, plain found., Central Ave. from 16th to 17th Sts., for Packard Motor Car Co., Bway. and 61st St., New York. A. Kahn, 1000 Marquette Bldg., Detroit, Mich., archt. Noted June 20.

N. J., North Arlington (mail Arlington) — BOOKBINDING FACTORY—W. H. Rademaekers & Son, 74 Oraton St., Newark, bids about Aug. 15, general contract 1 story, basement, brick, steel, plain found., River Rd. and Belmont Ave. $40,000. J. Centanni, 142 Market St., Newark, archt. Noted May 23.

N. Y., Brooklyn—GARAGE and GAS STATION—See "Contracts Awarded."

N. Y., Brooklyn—SERVICE GARAGE—See "Contracts Awarded."

Pa., Schuylkill Haven—POWER PLANT—July 8, by Boro, c/o R. A. Scott, ch. engr. 1 and 2 story, basement, 38 x 102 ft., and 48 x 63 ft., rein.-con., brick, steel, plain found. A. C. Wood, Stock Exch. Bldg., Phila., engr.

Tex., La Feria—PACKING PLANT—Texas Citrus Fruit Growers Exch., c/o J. Shary, Mission, taking bids 1 story, basement, 96 x 125 ft., brick, concrete, incl. equipment, machinery, $65,000. H. P. Smith, c/o Natl. Bank of Commerce Bldg., San Antonio, archt. Noted June 27.

Utah, Hyrum—HYDRO-ELECTRIC PLANT—July 15, by City Council, hydro-electric plant, incl. 500 kva. machinery, $70,000. J. L. Anderson, Hyrum, engr.

Wis., Milwaukee — BOX FACTORY — Eschweiler & Eschweiler, archts., 2101 Mason St., taking bids 1 story, 60 x 122 ft., brick, steel, Vienna St., for Downing Box Co., 1702 3rd St.

Contracts Awarded

Ark., Texarkana — BUS TERMINAL and SHOPS — Southwestern Transportation Co., Buder Bldg., St. Louis, 3 rein.-con., brick terminals and shops, to Bailey, Burns & Fitzpatrick, Merchants Natl. Bank Bldg., Dallas, Tex. Est. $150,000. Noted Apr. 11.

Calif., Los Angeles — FACTORY — Standard Auto Body Wks., 1501 South Central Ave., 1 story, 100 x 140 ft., brick, 15th and Paloma Sts., day labor.

Conn., New Haven — PLANT — Pittsburgh Plate Glass Co., 20 Mill St., 2 story, 50 x 120 ft., brick, steel, Mill St., to W. E. Greene Constr. Co., 255 Church St. Est. $40,000.

Conn., Stamford—SHOP—Stamford Water Co., Summer St., 2 story, 55 x 90 ft., brick, steel, concrete, to Vuono Constr. Co., 303 Main St. Est. $40,000. Noted June 6.

Fla., Tampa—PLANT—United States Phosphoric Products Co., J. R. McKee, genl. mgr., Ruskin Rd., East Tampa, and 61 Broadway, New York, 1 story, 130 x 160 ft., concrete, steel, owner builds; steel, to Ingalls Iron Wks., 720 4th Ave. S., Birmingham, Ala. Est. $300,000.

Ill., Chicago—DRESS FACTORY—Tabin & Picker, 2711 Belmont Ave., masonry and carpentry contract 3 story basement, 125 x 200 ft., rein.-con., brick, 4119-37 Belmont Ave., to Regan Constr. Co., 228 North La Salle St. Est. $200,000.

Ill., Chicago—FACTORY—C. H. Hanson Co., H. J. Hanson, pres., 178 North Clark St., general contract, top addition, 305 West Erie St., to Seipp & Lonergan, 178 North Clark St. Est. $50,000.

Ill., Chicago—POWER PLANT and DRYER HOUSE—W. G. Uffendell, archt., 39 South State St., general contract 2 story, 67 x 123 ft., to McKeown Bros., 112 West Adams St., for J. H. Murphy, 1531 Blackhawk St. Noted June 13.

Ill., Chicago—STORAGE—Quinn & Christiansen, archts., 360 North Michigan Ave., masonry and carpentry contract 2 story, 116 x 297 ft., brick, 4030-56 Fillmore Ave., to G. Thompson & Son Co., 30 North La Salle St., for Coca Cola Co., 1032 South Crawford Ave. Est. $200,000.

Kan., Wichita—OIL REFINERY—Phillips Petroleum Co., Bartlesville, Okla., 5,000 bbl. refinery, $150,000. Owner builds. A. H. Rinly, Bartlesville, Okla., engr.

Mass., Cambridge—FOUNDRY—J. B. Welch, 44 School St., Boston, 1 story, concrete, steel, plain found., Lansdowne St., to Thos. Mulcare, Inc., 66 Western Ave., Brighton.

Mass., Lowell — DYE HOUSE — Wamosit Power Co., W. B. French, supt., Lawrence St., 1 story, basement, 50 x 145 ft., brick, steel, plain found., Crosby St., separate contracts. Est. $40,000. C. T. Main, 201 Devonshire St., Boston, engr.

Mass., Northampton—BOILER HOUSE—Clark School for Deaf, A. T. Phillips, Round Hill Rd., 1 story, 80 x 85 ft., brick, steel, plain found., to M. I. O'Connor, 696 Bridge St.

Mass., Springfield—FOOD PLANT—Atlantic & Pacific Tea Co., Plainfield St., 3 story, rein.-con. bakery and perishables warehouse, Plainfield St., to L. L. Leveque Co., Edgehill Rd., Columbus, O. Est. $500,000.

Mass., Woburn—SHOWROOM, SERVICE and REPAIR GARAGE—J. W. Finelli, 32 Adams St., Newton, 1 story, 85 x 95 ft., brick, steel, plain found., 32 Winn St., separate contracts. Est. $40,000. M. Louis, 73 Cornhill, Boston, archt.

N. J., Paterson—MACHINE SHOP and FOUNDRY—Watson Flagg Eng. Co., 214 Straight St., Paterson, general contract 1 story, basement, 75 x 125 ft., brick, steel, plain found., 843 East 25th St., to J. W. Ferguson Co., 152 Market St. Est. $40,000. Noted June 28.

N. J., Perth Amboy — MANUFACTURING PLANT—Standard Underground Cable Co., 26 Washington St., general contract 3 story, basement, brick, steel, plain found., to Pub. Serv. Production Co., 80 Park Pl., Newark. Est. $200,000. Noted Mar. 7.

N. Y., Brooklyn—FACTORY—Metropolitan Eng. Co., 1250 Lexington Ave., 2 story, brick, to S. Musselwhite, 806 St. Johns Pl. Est. $40,000. Noted May 30.

N. Y., Brooklyn—FACTORY and STORE—Seth Cutting Realty Co., 150 Lawrence St., 6 story, Lawrence and Willoughby Sts., to W. Kennedy Constr. Co., 215 Montague St. Est. $450,000.

N. Y., Brooklyn—GARAGE and GAS STATION—J. Siegel Mason, 100 x 110 ft., brick, concrete, separate contracts. $40,000. E. M. Adelsohn, 26 Court St., archt. Noted May 30.

N. Y., Brooklyn — SERVICE GARAGE — S. Esposito & F. Buoniconto, 1067 67th St., 1 story, 100 x 100 ft., brick, concrete, 13th Ave. and 67th St., day labor and separate contracts. $40,000. Cassat, Muller & Ober, 44 Court St., archts. Noted June 13.

N. Y., Brooklyn — SERVICE GARAGE — Guida Holding Corp., 1085 East 42nd St., service garage, separate contracts and day labor, $50,000. M. Klein, 65 Court St., archt. Noted Junt 20.

N. Y., Schenectady — LAUNDRY — Capitol District Laundries of New York, C. H. Parmalee, pres., general contract 1 story, 100 x 150 ft., brick, steel, College and Green Sts., to Austin Co., 16112 Euclid Ave., Cleveland, O., $50,000.

O., Akron—FACTORY—Firestone Tire & Rubber Co., (1st unit) 2 story, 50 x 100 ft., concrete, brick, steel, to Carmichael Constr. Co., Central Savings & Trust Bldg., $200,000.

O., Canton—FACTORY—Old King Cole, Inc., 920 Market Ave. S., 2 story, basement, 100 x 180 ft., brick, steel, 1800 22nd St. N. E., to Warren-Hoffman Co., Witters Bldg., $40,000.

O., Cleveland—BOILER HOUSE—City, W. R. Hopkins, city mgr., 40 x 82 ft. brick, steel, concrete, to B. Shields Co., Citizens Bldg., $29,800. Noted June 28.

O., Cleveland — FACTORY — F. Zimmerman Co., F. Zimmerman, pres., West 110th St. and Berea Rd., 1 story, 30 x 120 addition, to H. G. Slatmeyer & Son Constr. Co., 203 Lakeside Ave. Est. $40,000. Noted June 20.

O., Columbus—BAKERY—General Baking Co., 415 Buckingham St., 1 story, basement, 150 x 181 ft., brick, steel, concrete, Buckingham St., to Boyajohn & Barr, 299 South Park St., $115,000.

Pa., Pittsburgh—PLANT—Miller Printing Mchy. Co., N. S., 1 and 2 story, basement, 50 x 180 ft., brick, steel addition, to D. T. Riffle, 1007 Forbes St. Est. $50,000.

Tex., Ft. Worth—MILL—Universal Mills, Riverside St., and G. J. Stone, pres., rein.-con. mill and elevator, Kings Highway, to C. M. Davis, 405 Cotton Exch. Bldg., $74,700. Footings poured.

Vt., White River Junction—ROUND HOUSE—Central Vermont R.R., subsidiary Canadian National Ry., P. D. Fitzpatrick, ch. engr., St. Albans, 1 story, brick, steel, plain found., to E. D. Ward Co., 82 Foster St., Worcester, Mass., $40,000.

Wis., Milwaukee—RAILROAD SHOP—Chicago, Milwaukee, St. Paul & Pacific R.R. Co., C. F. Loweth, ch. engr., Chicago, Ill., 1 story, 200 x 1000 ft. brick, steel, Milwaukee Yards, to Foundation Co., 120 Liberty St., New York, $950,000-$1,000,000.

Wis., Oshkosh — NEWSPAPER PLANT — Hicks Printing Co., 2 story, 75 x 160 ft. bedford stone, to C. L. Meyer & Sons, 50 State St.

Ont., Chatham—FACTORY—Hayes Wheel & Forgings Ltd., 1 story, 200 x 400 ft., brick addition, to E. P. Muntz Ltd., Tenyle Bldg., Toronto. Est. $100,000. Noted June 13.

Ont., Newmarket — FACTORY — Office Specialty Mfg. Co., general contract 3 story, basement, 55 x 200 ft., rein.-con., brick, addition, plain found., to Herod Constr. Co., Mimico Beach, Toronto. Est. $150,000.

Ont., Toronto — FACTORY — See "Proposed Work."

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Buildings—Industrial (Continued)

Ont., Toronto — FACTORY — Auto-Strop Safety Razor Co., 83 Duke St., general contract, factory addition to S. Sullivan & Fried Ltd., 81 Victoria St.; plumbing and heating, to Purdy-Mansell Ltd., 63 Albert St.; sprinklers, to Grinnell Co. of Canada, 2440 Dundas St. Est. $100,000.

Ont., Toronto—FACTORY—F. J. Hartz Co., 24 Hayter St., masonry for 6 story, basement, rein.-con., brick, steel, stone, to R. Robertson & Sons, Confederation Life Bldg., concrete, to Ramsay Contg. Co., 39 Indian Crescent. Est. $200,000.

Ont., Toronto—FACTORY and OFFICE—R. H. Bishop, archt., Roger Miller, Bldg., general contract 5 story, basement, 130 x 130 ft., rein.-con., to Yolles & Rotenberg, 85 Richmond St. W.; cast stone, to Superior Stone Ltd., Victoria St., Kitchener; reinforcing steel, to Trussed Concrete Steel Co. of Canada, Federal Bldg., for Tip-Top Tailors, 256 Richmond St. W. Est. $600,000. Noted May 2.

Ont., Toronto — PLANT — New Method Laundry Co., 2 River St., general contract 2 story, basement, stone, brick, to R. Sheehy & Son, 751 George St., Peterborough; structural steel, to Desher Steel Constr. Co., 80 Commissioners St. Est. $125,000.

Buildings—Residential

Residential building projects at stages earlier than Bids Asked have been omitted from this issue. You may have the list of these 20 jobs, free of charge, by writing or wiring—

CONSTRUCTION NEWS

Engineering News-Record, Tenth Ave. at 36th Street, New York, N. Y.

Bids Asked

Calif., Los Angeles—Kass & Rubin, Quinby Bldg., taking bids 10 story, basement, 300 room, rein.-con., Franklin Ave. C. S. Lee, Petroleum Bldg., archt. Noted May 23.

Mass., Dorchester (sta. Boston)—See "Contracts Awarded."

N. J., Jersey City—See "Contracts Awarded."

N. J., Montclair—See "Contracts Awarded."

N. J., Nutley—See "Contracts Awarded."

N. J., Roselle—J. M. Lummis, 125 West 4th Ave., bids about July 15, on revised plans general contract 5 story, basement, brick, steel plain found., 130 West 5th Ave. $160,000. M. Kraut, 3010 Hudson Blvd., Jersey City, archt. Noted June 13.

N. Y., Brooklyn—See "Contracts Awarded."

N. Y., New York—See "Contracts Awarded."

N. Y., New York—Hecman Realty Co., bids about Aug. 1, separate contracts 30 story, 94 x 100 ft., brick, steel, apartment hotel, 215 West 106th St., $1,250,000. M. Del Gaudio, 545 5th Ave., archt. Noted May 16.

N. Y., New York—Hecman Realty Co., 206 Bway., bids about Aug. 1, separate contracts 25 story, 85 x 90 ft., brick, steel apartment hotel, 241 West 103rd St. $800,000. M. Del Gaudio, 545 5th Ave., archt. Noted Apr. 18.

N. Y., New York—Hecman Realty Co., 206 Bway., bids about Aug. 1, separate contracts 40 story, 106 x 146 ft. apartment hotel, 248 West 105th St. $2,200,000. M. Del Gaudio, 545 5th Ave., archt. Noted May 23.

N. Y., New York—Sulmer Realty Corp., 11 Park Pl., bids about July 15, general contract 16 story, 62 x 132 ft., brick, steel hotel, plain found., 305 West End Ave. $850,000. R. T. Lyons, 40 East 49th St., archt. Noted May 16.

N. Y., White Plains — See "Contracts Awarded."

Pa., Phila.—See "Contracts Awarded."

Wis., Milwaukee—R. E. Oberst, archt., 285 Farwell Ave., taking bids 3 story, basement, 88 x 100 ft., brick, plain found., Brady and Astor Sts., for F. Ulik, c/o architect.

Wis., Milwaukee—July 15, by H. L. Kuehnel, engrs., 625 Woodlawn Court, 8 story, basement, 75 x 150 ft., brick, rein.-con., plain found.

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Contracts Awarded

Calif., Sacramento—Paso Robles Realty Co., Hearst Bldg., San Francisco, 8 story, basement, 60 x 80 ft., steel, rein.-con. hotel, 8th and I Sts., to Mission Concrete Co., 270 Turk St., San Francisco, $150,000.

Calif., San Francisco—L. Peveri, 64 Bauer St., 3 story, basement, concrete, steel, Pierce St., day labor. $150,000. Irvine & Ebbets, Call Bldg., archts.

Calif., San Jose—Farmers Union, 3 story, basement, concrete hotel and store, to J. S. Sampson Co., Monadnock Bldg., San Francisco, $150,000. Noted Apr. 25.

Calif., Ventura — Los Angeles Syndicate, 7 story, basement, 100 x 100 ft., stone, marble hotel to Roth Building Co., 4359 Ponca St., North Hollywood, $250,000. Noted Apr. 25.

Ill., Chicago—Oldefest & Williams, archts., 605 North Michigan Ave., masonry and carpentry contract 6 story, 50 x 150 ft., rein.-con., brick, to Wahl Constr. Co., 3310 Belmont Ave.; plumbing, to Marcus Weil & Sons Co., 3222 Elston Ave.; heating, to Crosby & Beard Co., 163 West Harrison St.; wiring, to Hoffman Electric Co., 3711 Ogden Ave.; elevator, to Otis Elevator Co., 600 North Jackson Blvd., for Syndicate, c/o architects. Est. $250,000. Noted June 13.

Ill., Chicago—Oman & Lilienthal, archts., 431 North Michigan Ave., masonry and concrete contract 3 story, irregular shaped, brick apartment and stores, to Ames Constr. Co., 1639 East 79th St.; heating, to E. J. Claffey Co., 10 West Illinois St.; plumbing, to Marcus Weil & Sons Co., 3222 Elston Ave.; steel, to Reuter Bros., 5816 South Wood St.; carpentry, to Chemers Bros., 38 South Dearborn St., for G. Sperrison, c/o architects. Est. $300,000. Noted Apr. 25.

Ill., Chicago—H. Zisook, 4655 Lake Park Ave., masonry contract 4 story, 148 x 183 ft., brick, stone, to M. Rubin, 4958 North St. Louis Ave.; plumbing, to S. Gold, 2029 West Division St.; heating, to C. Schewer, 7924 South Chicago Ave. Est. $750,000. Noted Apr. 11.

Ind., South Bend—J. Jones, 1512 Prairie Ave., general contract brick, steel, incl. billiard room and bowling alleys, Indiana and Kendall Sts., to Szabo & Papay, 604 Cleveland Ave. Est. $160,000.

Mass., Boston—Elliott & Henderson, 80 West Cedar St., 10 story, basement, brick, stone, steel co-operative apartments, Arlington and Marlboro Sts., to E. R. Boyle, Inc., 129 Newbury St. Est. $400,000. Junior League of Boston, Inc., E. Warren, pres., 6 Commonwealth Ave., lessee. Noted May 9.

Mass., Dorchester (sta. Boston)—Owner, c/o Schein & Levine, archts., 448 Bway., Chelsea, 3 story, basement, 90 x 375 ft., stone, marble, steel, apartment and store, plain found., Park and Washington Sts., separate contracts under architect's supervision. $275,000.

Mich., Sault Ste. Marie—Paul Axlerod & Co., 160 North La Salle St., Chicago, Ill., 2 story, part basement 100 x 150 ft., brick, steel, rein.-con. theatre and apartment, plain found., to M. N. Hunt, Sault Ste. Marie. Est. $265,000.

N. J., Jersey City—Gorlin Constr. Co., Tube Concourse Bldg., 5 story, basement, brick, steel, plain found., separate contracts. $250,000. M. Kraut, 3010 Hudson Blvd., archt. Noted June 28.

N. J., Montclair—J. Smith, 78 North Fullerton Ave., 5 story, basement, 80 x 105 ft., brick, steel, plain found., separate contracts. $150,000. M Kraut, 3010 Hudson Blvd., Jersey City, archt.

N. J., Nutley—B. Lutsky & H. Metnick, 360 Sherman St., Passaic, 4 story, basement, 60 x 115 ft., brick, steel, plain found., separate contracts. $150,000. Preiskel & Skvarla, 631 Main Ave., Passaic, archts.

N. Y., Brooklyn—M. Berman, 590 Utica Ave., 6 story, East 52nd St. and Clarkson Ave., separate contracts. $275,000. Cohn Bros., 361 Stone Ave., archts. Noted June 13.

N. Y., Brooklyn — N. Freedman, 590 Utica Ave., 6 story, 100 x 130 ft., brick, timber, separate contracts. $275,000. Cohn Bros., 361 Stone Ave., archt. Noted June 13.

N. Y., Brooklyn—Greenrose Realty Corp., M. Rosenberg, pres., 588 Hinsdale St., East 5th St. and Avenue F, separate contracts. $250,000. M. Rohstein, 186 Joralemon St., archt. Noted June 13.

N. Y., Brooklyn—N. B. Realty Corp., J. Nass, pres., 6 Maple St., apartment, East 7th St. and Avenue S, separate contracts. $150,000. M. A. Cantor, 66 Court St., archt.

N. Y., Brooklyn—Wija Building Corp., W. Treib, pres., 26 Court St., apartments, 65th St. and 16th Ave., separate contracts and day labor. $500,000. Malkind & Weinstein, 93 Court St., archts. Noted June 13.

N. Y., New York—E. P. Halley & Halley Constr. Co., 41 East 42nd St., 6 story, 216 x 225 ft., Nagle Ave. and Sickles St., separate contracts. $1,000,000. E. Weck, 343 Madison Ave., archt.

N. Y., White Plains—J. Wennemor, 103 Park Ave., New York, separate contracts. $600,000. Margon & Holder, 29 West 57th St., New York, archts.

O., Cleveland—D. Perlick, 10528 Orville Ave., 3 story, basement, 70 x 103 ft. brick, East 132nd St., to A. Permut, 2627 Colchester Rd. Est. $150,000.

Ore., Portland—Lincoln Realty Co., 4 story, basement, 100 x 100 ft., rein.-con., plain found., 415 11th St., to G. C. Ulrich Co., Stock Exch. Bldg., $165,000.

Pa., Dormont (Pittsburgh P. O.)—H. Justin Brown, 2833 Bway. Ave., 5 story, basement, 40 x 110 ft. apartment, 2 story, 60 x 60 ft. garage, brick, hollow tile, Voekel Ave. $150,000. Owner builds. Private plans.

Pa., Phila.—H. Rose, Cresheim and Sedgwick Sts., 4 story, basement, 86 x 235 ft., rein.-con., brick, steel, plain found., 65th Ave. and 15th St., separate contracts. $450,000. Thalheimer & Weitz, 10 South 18th St., archts.

Ont., Toronto—S. T. Floyd, Canadian Pacific Railroad Bldg., general contract 6 story, basement, 88 x 144 ft., rein.-con., brick, stone, Edmund Ave., to H. A. Wickett Co. Ltd., 156 Front St. E.; excavation, to Lioni & Co., 1411 Dufferin St. Est. $50,000.

Ont., Windsor — W. Goldstein, 842 Dufferin Pl., general contract 4 story, basement, 100 x 103 ft., brick, stone concrete found., to Biltwell Constr. Co. Ltd., Security Bldg.; excavation, to National Powers Ltd., Security Bldg. Est. $250,000.

Buildings—Commercial

Proposed Work

Calif., Los Angeles—CLUB and GARAGE—Automobile Club of Southern California, West Adams and Figueroa Sts., part 2 and 4 story, and 3 story addition. $300,000. R. Coate, Architects Bldg., archt.

Calif., Stockton—THEATRE and STORE—Balch & Stanberry, archts., Film Exch. Bldg., Los Angeles, soon take bids rein.-con. Class "A." East Main St., for West Coast Theatres, Film Exch. Bldg., Los Angeles. $350,000. Noted June 13.

Calif., Van Nuys—RIDING ACADEMY—El Vanquero Saddle Club, E. W. Sparling, promoter, Van Nuys, riding academy building, incl. clubhouse, servants quarters, stables. $200,000.

Conn., Manchester—COMMUNITY HOUSE—Manchester Lithuanian Co-operative Assn. J. Chizius, 243 North Main St., brick, steel community house, incl. auditorium, banquet hall, library, pool rooms, bowling alleys, card rooms, Golway St. $125,000-$150,000. Engineer and architect not selected.

Conn., New London—HOSPITAL—Manwaring Memo Hospital Assn., F. W. Mercer, trustee, Mercer Bldg., plans by E. L. Scholfield, State St., 3 story, steel, brick. $125,000-$150,000.

Conn., Stamford—STORE—C. O. Miller Co., 186 Atlantic St., 5 and 6 story, brick, steel, Bank and Clark Sts. To exceed $150,000. Engineer and architect not selected.

Ill., Belleville—HOSPITAL—St. Clair Co., c/o Bd. Supervs. Hospital Com., sketches three 3 story, basement, rein.-con., brick, stone buildings. $600,000.

Ill., Chicago—GARAGE—Fox & Fox, archts., 38 South Dearborn St., soon lets contract 5 story, basement, 72 x 200 ft., rein.-con., 2036-40 North Clark St., for S. M. Earling, 1108 Leland Ave.

Ill., Chicago—STORE and OFFICE—C. A. Mueller, 5200 West Chicago Ave., plans by Stanton & Hodgdon, 307 North Michigan Ave., 3 story, basement, 125 x 212 ft., rein.-con., brick, Chicago and Laramie Aves. $400,000. Noted Feb. 28.

Ill., Decatur — OFFICE — Illinois Power & Light Corp., Std. Life Bldg., M. L. Harry, genl. mgr., sketches 3 story (ultimately 5 story), basement, 80 x 100 ft., brick, steel, stone, rein.-con., Wood and South Water Sts. $200,000. Private plans.

Ia., Des Moines — STORE — Montgomery Ward & Co., Chicago Ave. and Lamarr St., Chicago, Ill., store, 4th and Locust Sts. $300,000. Private plans. Montgomery Ward, Chicago, Ill., assoc. archt.

Kan., Kansas City—FIRE HEADQUARTERS—City plans by C. Keyser, Kansas City, 4 story, basement, brick, stone, 6th and Armstrong St. $175,000. Noted Mar. 14.

Kan., Topeka — EXCHANGE — Southwestern Bell Telephone Co., 11th and Pine Sts., St. Louis, Mo., soon lets contract 3 story, 90 x 100 ft. top addition, and 5 story, 50 x 90 ft. rear addition, rein.-con., brick, terra cotta, 816 Jackson St. I. R. Timlin, c/o owner, archt. Noted June 20.

La., New Orleans—ELECTRICAL—Public Service, Inc., Baronne St., 2 story, 72 x 150 ft., brick, steel, rein.-con., Tulane Ave. $200,000. Private plans.

Mass., Boston—HEALTH—City, G. R. White fund, City Hall, plans by Coolidge, Shepley, Bulfinch & Abbott, Ames Bldg., 3 story, basement, irregular sized, brick health unit, plain found. Parkman and Blossom Sts., West End. $160,000.

Mass., Boston — OFFICE — Western Union Telegraph Co., 169 Congress St., 27 story, basement, sub-basement, High St. To exceed $150,000.

Mass., Brockton—CLUBHOUSE—Italian Civic Assn., c/o A. Gennaco, 85 Main St., raising $150,000 or more funds.

Mass., Brockton—STORE and OFFICE—J. T. Corceran, 42 School St., store and office building, High St. $150,000 or more. Engineer and architect not selected.

Mass., Cambridge — SOCIETY — Cambridge Council 74, Knights of Columbus, J. F. Downey, chn. building com., 8 Magazine St., society building, incl. council chambers, gymnasium, swimming pool, garage, dormitories, ballroom, stores, Essex St. $150,000 or more.

Buildings—Commercial (Continued)

Mass., Middleton — HOSPITAL — Essex Co., R. M. Mitchell chn. com., Salem, soon takes bids 2 story, basement 40 x 135 ft., brick, steel addition, plain found., addition tuberculosis hospital. $150,000. Ashton, Huntress & Alter, 477 Essex St., Lawrence, archts. Noted Apr. 18.

Mass., Oak Bluffs—THEATRES—Edgartown Playhouse, Inc., A. Hall, mgr., Edgartown, sketches altering and improving Strand and Eagle Theatres. $150,000 or more. Private plans.

Mass., Worcester—HOSPITAL—Dpt. P. Buildings, P. P. Spaulding, supt., plans by G. C. Halcott, 32 Franklin St., tuberculosis hospital ward building of Belmont hospital group. $600,000.

Mich., Jackson—THEATRE—W. S. Butterfield Theatre Corp., 159 East Elizabeth St., Detroit, plans by M. H. Finkel, 153 East Elizabeth St., Detroit, 3 story, basement, 72 x 140 ft., rein.-con., brick, steel, plain found. $150,000.

Mich., Pontiac — HOSPITAL — City, H. A. Maurer, city clk., rein.-con., brick, steel, stone, plain found. $450,000. Engineer and architect not selected.

Mich., Royal Oak—HOTEL and THEATRE—G. S. Oliver Co., 300 East 4th St., plans by R. J. MacDonald, 429 Wayne St., Detroit, 4 story, basement, brick, steel, rein.-con., Washington and 4th Sts. $500,000.

Mich., Saginaw—LODGE TEMPLE—Loyal Order of Moose, 203 North Hamilton St., plans by C. Macomber, 306 Bd. of Commerce Bldg., 3 story, basement, 70 x 155 ft., rein.-con., brick, steel, plain found., Hamilton St. $150,000.

Mich., Saginaw—OFFICE—Peoples Building & Loan Assn., plans by Cowles & Mutscheller, Saginaw, 6 story, basement, 60 x 120 ft., rein.-con., brick, steel, stone, plain found., Jefferson and Federal Aves. $350,000.

N. H., Claremont — STORE and OFFICE — Claremont Furniture Co., M. Nassau, mgr., 65 Pleasant St., sketches by J. C. French, Jr., 28 South Main St., Randolph, Vt., 3 story, basement, brick, stone, plain found., Middle and Pine Sts. $150,000. Noted Dec. 6.

N. J., Montclair—PROFESSIONAL—A. Wallace, 204 Bellevue Ave., Upper Montclair, new plans by A. E. Ramhurst, 516 Bloomfield Ave., 3 story, basement, 30 x 145 ft., brick, steel, plain found., Bellevue Ave. $150,000. Noted June 6.

N. J., Newark—BANK—Howard Savings Institution, 768 Broad St., sketches by J. H. and W. C. Ely, 605 Broad St., 1 story, basement, 55 x 110 ft., brick, steel, plain found., 268-70 Clifton Ave. $150,000.

N. J., Perth Amboy—CLUB HOUSE—Fourth Ward Polish Citizens Club, c/o E. Wierzbicki, archt., 302 Hall Ave., 3 story, basement, brick, steel, plain found., Elm St. $150,000.

N. J., Perth Amboy—LOFT and STORE—C. I. Silk, c/o B. Goldberger, archt., 117 Smith St., sketches 3 story, basement, brick, steel, plain found., State St. $150,000.

N. Y., New York—BANK—Guttag Bros., 16 Exchange Pl., plans by H. Tanenbaum, 490 Main St., New Rochelle, 3 story bank, 42 Stone St. $150,000. Maturity early in August.

N. Y., New York—CLUB—Columbia Riding Club, 32 West 67th St., plans by Scott & Prescott, 34 East 23rd St., 7 story, riding club, 46-68 West 100th St. $1,000,000. Noted June 14, 1928.

N. Y., New York—CLUB—New York County Lawyers' Assn., 27 Pine St., plans by Cass Gilbert, 244 Madison Ave., 4 story, basement, 8-12 Vesey St. Noted June 10, 1926.

N. Y., New York—OFFICE, STORE and SHOWROOM—A. Grosfeld, 801 3rd Ave., office, store and showrooms, 309-315 East 48th St. $500,000. Engineer and architect not selected. Maturity in January.

N. Y., New York — STORAGE and RESTAURANT — Horn & Hardart Co., 600 West 50th St., plans by F. P. Platt & Bro., 221 West 57th St., 46 x 120 ft., 86 Water St. and 122 Pearl St. $175,000.

N. Y., New York—STORE and OFFICE—A. M. Bing & Sons Realty Co., 18 East 48th St., plans by Kohn & Vitolo, 56 West 45th St., 34 story, 75 x 105 ft., brick, steel, Madison Ave. and 52nd St. $1,000,000.

N. D., Bismarck—COMMUNITY—City and Burleigh Co., rein.-con., brick community center, 6,000 seating capacity, incl. swimming pool. $225,000. M. H. Atkinson, city aud.

O., Alliance—BANK and OFFICE—Mt. Union Square Co., c/o Lockwood, Greene & Co., archts., Hanna Bldg., Cleveland, 2 story, basement, 60 x 120 ft., brick, limestone. $150,000.

O., Cleveland—ARCADE—W. Taylor & Son Co., Euclid Ave., plans by Walker & Weeks, 2341 Carnegie Ave., 1 story, basement, steel, concrete, glass, Taylor Arcade. $150,000.

O., Cleveland—SALES and SERVICE—Arcade Garage Co., c/o A. L. Licker, Guarantee Title Bldg., plans by J. F. Steffens, Fidelity Bldg., 1 story, 80 x 428 ft., brick, steel, 1950 East 105th St. $150,000.

Okla., Shawnee — TEMPLE, STORE and OFFICE—A. F. & A. M. Lodge 27, c/o F. D. Keller, soon lets contract 5 story, basement, 100 x 140 ft., concrete, brick, steel, hollow tile, 9th and Bell Sts. $400,000. E. J. Peters, 210 Elks Bldg., Shawnee, archt. Noted Apr. 18.

Okla., Tulsa — BALL ROOM — Mid-West Amusement Co. plans by A. M. Atkinson, Mid-Continent Bldg., 2 story, basements, 100 x 100 ft., 10th and Detroit Sts. $350,000.

Pa., Pittsburgh — OFFICE — Gulf Refining Co., Frick Bldg., bids in November, general contract office building, 7th and Grant Sts. $1,000,000. Trowbridge & Livingston, 527 5th Ave., New York, archts. Noted Apr. 11.

Pa., Pottstown—THEATRE, STORE, etc.—H. Remhold, archt., 10 South 18th St., Phila., soon takes bids 3 story, basement, 125 x 180 ft., rein.-con., brick, steel, plain found., for St. Clair Corp., 402 DeKalb St., Norristown. $500,000.

R. I., Newport — BANK and OFFICE — Aquidneck Natl., Exch. Bank & Savings Co., 286 Thames St., sketches by T. M. James Co., 9 Park St., Boston, Mass., bank and office building, Colonial and Washington Sts. $150,000 or more.

Tex., Beaumont—THEATRE and OFFICE—T. P. Lee & M. F. Yount, c/o Yount-Lee Oil Co., San Life Bldg., purchased site and plan 14 story, brick, steel, stone, concrete found., Calder Ave. $1,000,000.

Tex., El Paso—CLUB—Braunton & McGee, archts., soon take competitive bids 7 story, part basement, brick, steel, concrete club, for Elks Club, c/o M. Schwartz, chn. building com. $200,000.

Tex., Paducah—COURT HOUSE—Cottle Co., c/o J. M. Wheatley, co. judge, sketches by Voelcker & Dixon, Perkins-Snider Bldg., Wichita Falls, 4 story, basement, natural stone. $150,000. Noted June 6.

Utah, Salt Lake City—WAREHOUSE—Western States Grocery Co., c/o C. C. Carpenter, 631 South 3rd West St., plans by E. F. Pierre, 1209 1st Natl. Bank Bldg., Ogden, 2 story, basement, rein.-con., brick, plain found. $200,000.

Vt., Barre — TEMPLE — Granite Lodge 35, F. L. Small, chn. building com., masonic temple. $150,000. Engineer and architect not selected.

Ont., Hamilton—GAOL—City gaol. $200,000.

Ont., Sarnia—HOTEL—Sarnia Development Co., J. F. Newton, 6 story, rein.-con., brick, steel, plain found., Christiana St. $350,000.

Ont., Toronto — GARAGE — N. G. Beggs, 6 Jean St., 4 story, rein.-con., steel, Church St. $150,000.

Que., Montreal — HOSPITAL — St. Mary Memorial Hospital, 923 Dorchester St., hospital addition. $350,000.

Que., Montreal—HOSPITAL—Montreal University, St. Denis St., plans by E. Cormier, 209 Mansfield St., hospital. $350,000.

Que., Montreal—HOSPITAL—City, Montreal Childrens Hospital addition, St. Antoine St. $200,000.

Que., Montreal—OFFICE—Crown Trust Co., 10 story, St. James St. $750,000.

Que., Montreal—OFFICE—Sun Life Assurance Co., Metcalfe St., plans by A. J. C. Paine, Sun Life Bldg., 10 story, Place d'Anuers Sq. $350,000.

Que., Montreal—PRISON—Provincial Govt., Quebec, female prison. $200,000.

Que., Montreal—Y. M. C. A., Drummond St., plans by Ross & MacDonald, 1 Belmont St., new building. $500,000.

Que., Quebec City—EXCHANGE—Bell Telephone Co., 118 Notre Dame St. W., Montreal, telephone exchange, $500,000. Private plans.

Que., St. Vincent de Paul—PENITENTIARY—Dpt. P. Wks., Otawa, Ont., new penitentiary wing. $450,000.

Bids Asked

Calif., San Francisco — See "Contracts Awarded."

Ill., Chicago—OFFICE—Zimmerman, Saxe & Zimmerman, archts., 212 East Superior St., bids about July 15, 6 story, basement, 100 x 170 ft., rein.-con., brick, 1307-13 Wabash Ave., for Warner Bros. Pictures, Inc., 839 South Wabash Ave. $350,000.

Ind., Michigan City—MUNICIPAL—B. Spaulding taking bids rein.-con., brick, incl. auditorium 6th and Franklin Sts. $200,000. Frazier, Blouke & Hubbard, 80 East Jackson St., Chicago, Ill., archts. Noted Apr. 18.

Ind., South Bend—STORE—Utilities Building Co., taking bids 35 story, basement, brick, rein.-con. $150,000. Freyermuth & Maurer, South Bend, archts.

Kan., Hutchinson—COURT HOUSE and JAIL—Reno Co., c/o J. A. Schardein, co. clk., bids about Aug. 1, 4 story, 120 x 150 ft., rein.-con., brick, stone. $450,000. W. E. Hulse & Co., Stamey Hotel Bldg., archt. Noted May 2.

Me., Fairfield—HOSPITAL—July 9, by State Central Maine Sanatorium, J. F. Shaw, supt., 3 story, basement, brick patients building, plain found. $150,000 or more. H. T. Muzzy, 173 Main St., Waterville, archt. Noted Jan. 31.

Mass., Boston—OFFICE—Boston Insurance Co., W. R. Hedge, pres., 87 Kilby St., taking bids 11 story, basement, brick, limestone, steel addition, plain found., Kilby St. corner Milk St. To exceed $150,000. Appleton & Stearns, 53 State St., archts.

Mass., Roxbury (sta. Boston)—CHILDREN'S—New England Hospital for Women & Children, D. Horton, pres. bd. trustees, taking bids 3 story, basement, 60 x 160 ft., brick, limestone, plain found., Dimock St. $200,000. Kendall, Taylor & Co., 142 Berkley St., Boston, archt.

Minn., Minneapolis—WAREHOUSE—July 8, by National Tea Co., O. H. Lendin, vice pres., 2837 3rd Ave. S., 3 story, basement, brick, timber, 29th St. and Clinton Ave. $400,000. O. N. Newstrom, 804 Metropolitan Life Bldg., archt.

Mo., St. Louis—STORE—F. W. Woolworth & Co., W. M. Smith, local mgr., Pierce Bldg., bids about July 11, 4 story, basement, 77 x 127 ft., rein.-con., brick, stone, terra cotta, Olive and 8th Sts. Aegerter & Bailey, Ry. Exch. Bldg., archts. Noted June 13.

Mont., Butte—MEDICA-DENTAL—July 10, by W. Arnold, archt., Metals Bank Bldg., 6 story, basement, 84 x 100 ft., rein.-con., terra cotta, Granite St., for Medical & Dental Building, Inc., c/o architect.

Neb., Hastings—MUNICIPAL—July 15, by City, A. T. Bratton, clk., 2 story, rein.-con., brick, stone, 1st and Burlington Sts. $180,000. M. L. Evans, Brandes Bldg., archt.

N. J., Jersey City — LOFT and STORE — Owner, c/o C. H. Zeigler, archt., 75 Montgomery St., bids about July 15, general contract 3 story, basement, 25 x 130 ft., brick, steel, plain found., Hudson Co. Blvd. and Journal Sq. $150,000. Noted May 8.

N. J., Newark—HOSPITAL, NURSES HOME and POWER HOUSE — Guilbert & Betelle, archts., 20 Branford Pl., bids about July 15, general contract 10 story, basement, 100 x 190 ft., brick, steel, hospital, 4 story, basement, 41 x 135 ft. nurses home, and 1 story, basement power house, Newton and William Sts., for Newark Memorial Hospital, A. Goertz, pres., 340 Bank St. $1,250,000. Noted May 30.

N. J., Orange—OFFICE and STORE—Westmont, Inc., c/o M. Villanueva, archt., 604 Central Ave., East Orange, taking bids 2 story, basement, brick, steel, plain found., Lackawanna Plaza. $150,000.

N. J., Paterson—HALL OF RECORDS—Bd. Freeholders Passaic Co., Court House, bids about July 15, 8 story, basement, brick, steel, rein.-con., plain found., Grand and Spring Sts. $1,000,000. H. B. Crosby, 125 Ellison St., archt. Noted Mar. 14.

N. J., Perth Amboy—OFFICE—See "Contracts Awarded."

N. Y., Carthage—BANK—National Exchange Bank of Carthage, bids about July 10, bank, Halsey, McCormick & Helmer, 286 5th Ave., New York, archts.

N. Y., New York — OFFICE and BANK — Flamount Realty Corp., C. W. Gerstenberg, pres., bids about Aug. 1, general contract office and bank building, 340 East 149th St. $550,000. Becker & Levy, 349 East 149th St., archts. Noted June 27.

N. Y., Richmond Hill—MARKET and OFFICE—See "Contracts Awarded."

O., Apple Creek — COTTAGES, POWER HOUSE and LAUNDRY—July 18, by H. H. Griswold, dir. P. Welfare, 9th and Oak Sts., Columbus, two 100 x 350 ft. cottages, power house, laundry. $750,000. Gustave Drach, Inc., Union Trust Bldg., Cincinnati, archts. and engrs. Noted Dec. 13.

O., Mansfield—July 9, by Y.M.C.A., 4 story, basement, 90 x 167 ft., brick, steel, concrete building, $300,000. Vernon Redding & Associates, Walpark Bldg., archts.

Pa., Phila.—COMMERCIAL—See "Contracts Awarded."

Wash., Seattle — WAREHOUSE — E. G. Morgan, archt., Dexter Horton Bldg., taking bids 14 story, basement, rein.-con. warehouse, incl. 120 offices, conveyor belt for unloading freight, 20 ton elevator, 1st St. S. and Massachusette Ave., for Taylor-Edwards Warehouse & Transfer Co., 1518 1st St. $540,000.

Contracts Awarded

Calif., Los Angeles — OFFICE — Killem, Christie & Law, c/o T. R. Jacobs, archt., Architects Bldg., 13 story, basement, 150 x 216 ft., steel, 5th St., to Simpson Co., Architects Bldg.

Calif., Los Angeles—THEATRE and OFFICE—N. C. Stein, Elks Club, 125 x 235 ft., rein.-con., Beverly Blvd., to W. C. Pennell, 804 South Vermont Ave., $150,000.

Ill., Chicago — GARAGE — Nimmons, Carr & Wright, archts., 333 North Michigan Ave., general contract 2 story, basement, 100 x 181 ft., brick, stone, 212-21 Lake St., to B-W Constr. Co., 720 Cass St., for R. G. Lydy, 3 West Wacker Dr. Est. $275,000.

Ill., Chicago—PRINTING PLANT—Weiss & Niestdat, archts., 53 West Jackson Blvd., masonry and carpentry contracts 1 story, 241 x 351 ft., brick, to H. Erickson, 228 North La Salle St., for W. F. Hall Printing Co., 4600 Diversey St. Est. $300,000. Noted May 9.

Ind., Indiana Harbor — OFFICE — Graham, Anderson, Probst & White, archts., 80 East Jackson Blvd., Chicago, Ill., general contract 6 story, basement, 45 x 150 ft., brick, to J. B. French & Co., 30 North Michigan Ave., Chicago, Ill., for Inland Steel Co., 38 South Dearborn St., Chicago, Ill.

Ky., Louisville—OFFICE—Louisville & Nashville R.R. Co., 10th St. and Bway., W. H. Courtenay, ch. engr., 11 story, rein.-con., brick, steel, on 309 x 913 ft. site, 10th and Bway., to United Eng. & Constr. Co., 125 East 46th St., New York, $750,000 cost plus percentage basis. Noted Jan. 10.

Md., Baltimore—STORE—Wyatt & Nolting, archts., Keyser Bldg., 3 story, basement, concrete, brick, steel, to North-Eastern Contr. Co., West Madison St., $150,000. Noted June 13.

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Buildings—Commercial (Continued)

Mass., Abington—BANK—Abington Savings Bank, 1 story, basement, to C. A. Batson Co., 26 Arlington St., Brockton. Est. $150,000. Noted June 13.

Mass., Boston—DEPARTMENT STORE—R. H. Stearns Co., 140 Tremont St., altering 11 story, basement, 60 x 180 ft., brick, steel, plain found., to W. A. Wentworth Co., 107 Pacific St., Cambridge. Est. $150,000 or more.

Mass., Boston—OFFICE—E. P. Faunce, 9 Elm St., altering 5 story, basement, stone, steel, plain found., Elm St., to McMillian & Co., 45 Rutland St. Est. $150,000 or more.

Mass., Boston—STORE and OFFICE—L. F. Kaufman, 367 Boylston St., altering 6 story, basement, 55 x 100 ft. brick, plain found., 367 Boylston St., to Whidden-Beekman, Inc., 250 Stuart St. Est. $150,000.

Mass., Norwood—ARMORY—Commonwealth of Massachusetts, J. F. Stevens, State House, 2 story, basement, brick, plain found., to John Bowen Co., 184 Dudley St., Boston, $126,847. Noted June 6.

Mass., Springfield—OFFICE—Republican Co., 32 Cypress St., masonry and steel for 11 story, 70 x 142 ft., brick, steel, to Fred T. Ley Co., Inc., 1215 Main St. Total est. $500,000. Noted May 12.

Mich., Detroit—STORE and BALL ROOM—Metropolitan Holding Co., c/o C. N. Agree, archt., 1140 Book Tower, 2 story, basement, 150 x 150 ft., rein.-con., brick, steel, plain found., to W. E. Wood Co., Union Trust Bldg. Est. $150,000.

N. J., Newark—GARAGE—Kent Garage Investment Corp., M. A. Kent, pres., 350 Madison Ave., New York, 20 story, basement, 180 x 190 ft., brick, steel, rein.-con., plain found., Warren and Washington Sts., to Fred T. Levy, 213 East 43rd St., New York. Est. $1,000,000.

N. J., Perth Amboy — ARMORY — State Armory Bd., State House, Trenton, general contract 2 story, basement, brick, steel, plain found., Lewis Ave., to G. W. Mercer Constr. Co., 216 Smith St. Est. $150,000. Plumbing, to Burns Lane & Richardson Co., 301 Burnet St., New Brunswick; heating, to John Nelles Co., 835 Springfield Ave., Irvington; electrical work, to Buhl & Caffrey, 35 Hudson St., Newark.

N. J., Perth Amboy—OFFICE—Maple Realty Co., 169 Smith St., 2 story, basement, 100 x 175 ft., brick, steel plain found., separate contracts. $150,000. Greisen & Tusik, 175 Smith St., archts. Noted June 6.

N. J., Plainfield—STORE—Nathan Meyers & Sons, 303 East 4th St., general contract 2 story, basement, 70 x 135 ft., brick, steel, plain found., Watchung Ave., to A. Milne, 15 Watchung Ave. Est. $150,000. Montgomery, Ward & Co., Chicago, Ave., Chicago, Ill., lessee. Noted June 13.

N. Y., Port Jefferson — THEATRE, STORE and APARTMENT — Allerton Theatre Corp., c/o H. Rosensohn, archt., 188 Market St., Newark, general contract 3 story, basement, 50 x 100 ft., brick, steel, plain found., to James Rosensohn, Inc., 188 Market St., Newark. Est. $150,000. Noted June 13.

N. Y., New York—STORAGE, STORE and OFFICE—Schulte Real Estate Co., 386 Bway., 6 story, 93 x 100 ft., brick, steel, to York Building Co., 151 West 42nd St. Est. $175,000. Noted May 23.

N. Y., New York — STUDIO — Ettl Studio **Building Co., 174 West 13th St.**, altering studio and work shops, to Standard Concrete Steel Co., 250 8th Ave. Est. $60,000. Noted May 30.

N. Y., New York — WAREHOUSE and GARAGE — Colez Realty Corp., A. Lazarone, pres., 532 East 180th St., 7 story, 50 x 89 ft., brick, to Raymore Constr. Co., 631 East Tremont St. Est. $140,000. Noted June 20.

N. Y., Richmond Hill—MARKET and OFFICE—C. Shapiro, 162-11 98th St., Howard Beach, 2 story, brick, separate contracts and day labor. $150,000. E. M. Adelsohn, 26 Court St., archt. Noted June 20.

N. Y., Wingdale—EMPLOYEES HOME, etc.—Comr. Mental Hygiene, Capitol, Albany, employees accommodations, married employees building, at Harlem Valley State Hospital, to Miller & Gaynor, 502 Church St., Poughkeepsie, $104,500. Noted Apr. 25. Heating, to Ita Willner, 500 West 167th St., New York, $8,161; sanitary work, to Levine Plumbing Co., Inc., 330 West 47th St., New York, $10,163; electrical work, to T. H. Green Electric Co., Inc., 31 South Water St., Rochester, $4,997.

O., Ashtabula — THEATRE, STORE and OFFICE—Palace Theatre Co., c/o M. A. Shea, Main St., 2 and 3 story, basement, 43 x 132 ft., brick, steel, to Johnson & Erickson, Euclid Ave., Willoughby. Est. $150,000. Noted April 25.

O., Cleveland—BANK—Cleveland Trust Co., c/o A. A. McCashin, East 9th St. and Euclid Ave., 1 story, steel, marble, to Lundoff-Bicknell Co., B. F. Keith Bldg. Est. $150,000. Noted Mar. 7.

O., Cleveland—WAREHOUSE—Nickel Plate Development Co., Terminal Tower, 1 story, 90 x 201 ft., brick, steel, concrete, to S. W. Emerson Co., 1836 Euclid Ave. Est. $150,000. Wilbur Watson & Associates, 4614 Prospect Ave., archts.

O., Cleveland—WAREHOUSE and OFFICE—Norton Co., Barbers Crossing, Worcester, Mass.,

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4 story, basement, 100 x 140 ft., rein.-con., brick, to Crowell & Little Constr. Co., Hanna Bldg. Est. $150,000. Noted June 1.

O., Toledo—BANK—Ohio Savings Bank & Trust Co., Madison Ave., sinking shafts, constructing foundation for bank, Madison Ave., to A. Bentley & Sons, Belmont St. $250,000. Noted May 16.

Okla., Tulsa—OFFICE and STORE—Philips, Philtower Bldg., 5 story, 140 x 150 ft., rein.-con., brick top addition, 5th and Boston Sts., to C. Dunning, 5th and Boston Sts., $300,000.

Pa., Phila. — COMMERCIAL — Archway Realty Co., c/o Pottash Bros., Swanson and Wolf Sts., 6 story, basement, 108 x 138 ft., rein.-con., brick, steel, plain found., 2116-30 Arch St., separate contracts. $400,000. Private plans.

Pa., Phila.—SALES and SERVICE—Twenty-Second Street Realty Corp., c/o E. A. Stopper, archt., 10 South 18th St., 2 story, mezzanine, basement, 64 x 133 ft. and 30 x 64 ft., rein.-con., brick, steel, plain found., 248-54 North 22nd St., to A. R. Raff, 1635 Thompson St. Est. $175,000. Noted June 6.

Tenn., Memphis—BANK—First Natl. Bank, 3 story, basement, 60 x 75 ft., steel, rein.-con. annex, to Wessel Constr. Co., Front St., $175,000.

Tenn., Nashville—OFFICE—National Life & Accident Insurance Co., 301 7th Ave. N., 5 story, basement, 52 x 85 ft., rein.-con. brick, stone, steel addition, to Foster & Creighton, 4th & 1st Bank Bldg., $150,000.

Utah, Ogden — MAUSOLEUM — Mt. Ogden Cemetery Co., 600 cryt, rein.-con., marble, plain found., Mt. Ogden Memorial Park, to Salt Lake Mausoleum Co., Salt Lake City. Est. $250,000.

Utah, Salt Lake City—OFFICE and WAREHOUSE—General Motors Corp., General Motors Bldg., Detroit, Mich., and Salt Lake City, rein.-con., brick, plain found., 4th South St. and Rio Grande Ave., to F. J. Kerchoff, Denver, Colo., $175,000.

Utah, Salt Lake City—STORE—Walker Bros. Dry Goods Co., rein.-con., brick, steel, plain found., Bway. and Main St., to Fuller Bros., Salt Lake City. $200,000.

Wash., Seattle—AERONAUTICS HALL—Bd. Regents University of Washington, 4 story, 150 x 160 ft., brick, cast stone, to Henrikson-Alstrom Constr. Co., Securities Bldg., $259,640. Noted May 16.

W. Va., Charleston—OFFICE—Appalachian Electric Power Co., subsidiary of American Gas & Electric Co., 30 Church St., New York, office building, to Ward & Ward, Charleston, $229,700.

Wis., Milwaukee — BANK — E. R. Liebert, archt., 49 East Wells St., general contract 5 story, basement, 60 x 1444 ft., steel, to S. Czoplewski, 877 2nd Ave., for Franklin Realty Building Co., 85 East Wells St. Est. $300,000. Noted Jan. 31.

Ont., New Toronto—THEATRE—Columbia Pictures of Canada, Ltd., 21 Wilton Sq., Toronto, general contract 2 story, basement, concrete brick, steel, stone, to A. D. Bennett, Temple Bldg., Toronto. Est. $100,000. Noted Jan. 10.

Ont., Saulte Ste. Marie—HOSPITAL—C. C. Wood, archt., Imperial Bldg., Sarnia, 3 story, basement, concrete, brick, steel addition, to W. R. Wiber, 162 Upton Rd., for Plummer Memorial Hospital. Est. $160,000. Noted May 30.

Ont., Toronto—GARAGE and SHOWROOM—H. E. Given, 684 Yonge St., 2 story, basement, brick, steel, concrete found., to W. Davidson & Co., 188 Duke St. Est. $150,000.

Ont., Toronto — MARKET — Grand Central Market Syndicate, 606 Commerce & Transportation Bldg., general contract, 1 and 2 story, basement, 140 x 257 ft., brick, stone rein.-con., to De Jonckheere Constr., Co., Ltd., 1205 Bay St.; concrete piling, Raymond Concrete Pile Co., Mail Bldg.; steel joists, to Sarnia Bridge Co., Federal Bldg. Est. $250,000. Hot air heating, terrazzo. Noted Sept. 6.

Ont., Toronto—OFFICE—Abitibie Power & Paper Co., 67 Yonge St., general contract 2 story, basement, 50 x 200 ft., rein.-con., brick, steel, to George A. Fuller Co. of Canada, McLean Publishing Bldg., excavation, to Lioni & Co., 1411 Dufferin St. Est. $200,000. Noted Nov. 8.

Ont., Windsor—OFFICE—Border Cities Star, 127 Ferry St., general contract 12 story, basement, brick, steel, rein.-con., plain found., Ouellette Ave., to S. E. Dinsmore Co. Ltd., Security Bldg.; structural steel, to Canadian Bridge Co. Ltd., Walker Rd., Walkerville; reinforcing steel, Trussed Concrete Steel Co., Canada, Walker Rd., Walkerville. Est. $300,000.

Buildings—Educational, Religious

Proposed Work

Ala., Auburn—ADMINISTRATION—Alabama Polythechnic Institute, B. Knapp, pres., plans by Warren, Knight & Davis, Protective Life Bldg., Birmingham, Bibb Graves Administration Building. $250,000.

Calif., Berkeley — LIBRARY — City, J. N. Edy, city mgr., Class "A" public library. $269,000 available. Architect not selected.

Calif., Escondido—SCHOOL—Escondido Union High School Dist., plans by Kistner & Co., Architects Bldg., Los Angeles, 2 story auditorium and classroom building, 1 story, cafeteria, and 1 story manual arts and shop, all rein.-con. $150,000.

Calif., Red Bluff—SCHOOL—Red Bluff Grammar School Dist., plans by W. H. Weeks, 111 Sutter St., San Francisco, brick or rein.-con. $150,000

Calif., San Diego—HIGH SCHOOL—San Diego High School Dist., plans by Kistner & Co., Architects Bldg., Los Angeles, Hoover High School, 3 story, rein.-con. main building, 1 story, brick shop, and 1 story, concrete gymnasium. $400,000.

Colo., Colorado Springs — CHAPEL — Bd. Trustees Colorado College, receiving competitive plans Shove Memorial Chapel. $175,000. Noted Dec. 6, 1928.

Conn., New Haven—SCHOOL—City, R. E. Hall, secy. Bd. Educ., 2 story, basement, brick, steel, Dyer St. and Boulevard. $150,000 or more. Engineer and architect not selected.

Conn., New London — CHURCH — Hartford Roman Catholic Diocesan Corp., Hartford, A. Aneed, pastor, New London, 1 story, basement for Syrian Parish, West Colt St. $125,000-$150,000. Engineer and architect not selected.

Conn., Stamford—SCHOOL—City, Bd. Educ., Godfrey, 2 story, basement, brick, steel, Franklin St. $150,000. Engineer and architect not selected.

Ill., Chicago — COLLEGE — Illinois College Chiropody & Foot Survery, G. E. Wyneken, pres., plans by I. H. Riley Co., 3401 South Parkway, 5 story, 1327 North Clark St. $200,000.

Ind., Culver—SCHOOL—School Comrs. Marshall Co. (Plymouth), plans by Bradley & Babcock, 221 West Wayne St., Ft. Wayne, 1 story, basement, 100 x 120 ft., brick, steel, hollow tile, incl. gymnasium. $150,000.

Ind., Michigan City—PARISH HOUSE and AUDITORIUM—Frazier & Rafferty, archts., 75 East Wacker Dr., Chicago, Ill., soon lets contract, 2 story, brick, limestone, 6th and Franklin Sts., for Trinity Episcopal Church, 614 Franklin St. $200,000. Noted May 23.

Ind., West Lafayette — DORMITORY and UNION — Purdue University, plans by Pond, Pond, Martin & Lloyd, 180 North Michigan Ave., Chicago, Ill., brick, rein.-con., men's dormitory and union building on campus. $150,000.

Ill., Oak Park—SCHOOL—Bd. Educ. plans by Childs & Smith, 720 North Michigan Ave., brick addition, 238 Augusta St. $165,000.

Kan., Leavenworth—ACADEMY—St. Mary's College of the Sisters of Charity, c/o Mother Oliver, superior, sketches 4 story, basement, 121 x 212 ft., rein.-con., brick, stone. $600,000.

Md., Baltimore—CHURCH—Buckler & Fenhagen, archts., 324 North Charles St., rejected bids Feb. 14, 1 story, basement, 88 x 133 ft. concrete, brick, steel, stone, Gwynn Oak and Milford Aves., for Howard Park Methodist Episcopal Church. $150,000. H. Massart, 324 North Charles St., engr. Noted Feb. 14.

Md., Baltimore—INSTITUTE—Johns Hopkins University plans by John Russell Pope, 542 5th Ave., New York, law institute. $250,000. Maturity about September.

Md., McDonough—DORMITORY—McDonogh School for Boys plans by Smith & May, Calvert Bldg., 3 story, basement, 47 x 150 ft., brick, steel. $150,000.

Mass., Amherst—HORTICULTURE—Massachusetts Agriculture College, F. C. Kenney, plans by James H. Ritchie & Associates, 100 Arlington St., Boston, brick, steel school unit. $200,000.

Mass., Brockton — SCHOOL — Sacred Heart Roman Catholic Church, J. S. Vermette, pastor, 235 Court St., 2 story, basement, brick, plain found., Manchester and Court Sts. $150,000 funds being raised for same. Engineer and architect not selected.

Mass., Brookline—SCHOOL—Town, Bd. Selectmen, revised plans by W. B. Coffin, 120 Boylston St., Boston, Lawrence School, 2 story, basement, brick, Francis St. $450,000. Noted May 9.

Mass., Cambridge—CLUB—Harvard College (Harvard Corp.), C. H. Grandgent, chn. com., faculty club, Quincy St. $200,000 appropriated. Engineer and architect not selected.

Mass., Cambridge — SCHOOL — City, brick, stone, Harvard and Fayette Sts. $150,000 or more. Engineer and architect not selected.

Mass., Dorchester (sta. Boston) — HIGH SCHOOL—City of Boston, Schoolhouse Dpt., soon takes bids 4 story, basement, brick, limestone addition, Centre St., plain found. $200,000. Newhall & Blevens, Inc., 9 Park St., Boston, archts.

Mass., New Bedford—SCHOOL—City, E. B. Hammond, bd. trustees, soon takes bids 2 story, basement, 60 x 170 ft., brick, steel, concrete, plain found., vocational school for girls, Hillman and Ash Sts., incl. workshops, gymnasium, assembly hall. $250,000. C. Hammond & Son, North Water St., archts. Noted July 5, 1928.

Mass., Plymouth—HIGH SCHOOL—Town, O. Edes, chn., special building com., Senior and Junior High School, Lincoln St. $25,000. Engineer and architect not selected. Noted Oct. 18.

Mass., Somerville—HISTORICAL—Somerville Historical Society, A. S. Haskell, pres., 60 Putnam St., revised plans, by W. A. Dykeman, 10 Devonshire St., Boston, 3 story, basement, brick, limestone, plain found. $150,000. Former bids rejected. Noted Feb. 28.

Buildings—Educational, Religious (Cont.)

Mass., Springfield — CHURCH — St. James Episcopal Church, T. Davies, Bishop, Episcopal Society, 37 Chestnut St., plans by C. C. Coveney, 184 Boylston St., Boston, 1 story, basement, brick, stone, in East Springfield. $200,000. Noted Mar. 28.

Mass., Webster—SCHOOL—St. Louis Roman Catholic Parish, G. H. Dolan, pastor, 15 Lake St., soon lets contract, 1 story, basement, 58 x 97 ft. and 2 story, basement, 84 x 157 ft., brick, steel. $200,000. J. W. Donohue, 1200 Main St., Springfield, archt. Noted May 2.

Mich., Muskegon — SCHOOL — Bd. Educ., High School Bldg., plans by F. Forster, 240 Lyman Bldg., 2 story, basement, rein.-con., brick, steel, stone, plain found., Woods and Jackson Sts. $250,000.

N. J., Asbury Park—CHURCH—Our Lady of Mt. Carmel, Springwood and Atkins Aves., 2 story, basement, brick, steel, plain found., Prospect St. and Bangs Ave. $150,000.

N. J., Bergenfield — SCHOOL — Bd. Educ., Boro Hall, will not build 2 story, basement, brck, steel, plain found., Highway Ave. $200,-000. Project abandoned.

N. J., East Paterson—SCHOOL—Bd. Educ., Boro Hall, revised plans by Lee & Hewitt, 152 Market St., Paterson, 2 story, basement, brick, steel, plain found., Gantnor Ave. $150,000. Noted May 30.

N. J., Irvington (br. Newark)—SCHOOL—Bd. Educ., 1253 Clinton Ave., sketches by V. H. Strombach, 1243 Springfield Ave., 3 story, basement, brick, steel, plain found., Berkeley Terrace. $700,000. Noted Mar. 28.

N. J., Newark—SYNAGOGUE—Congregation Adas Israel Mesnayes, B. Lecy, pres., 34 Prince St., plans by F. Grad, 1023 Broad St., 1 story, basement, 80 x 130 ft., brick, steel, plain found., 66-70 Wolcott Terrace. $150,000. Noted June 28.

N. J., Newark—SYNAGOGUE—Congregation Adas Israel Misnayes, B. Levy, pres., 34 Prince St., sketches by F. Grad, 1023 Broad St., 1 story, basement, 80 x 130 ft., brick, steel, plain found., 66-70 Wolcott Terrace. $150,000.

N. J., Rutherford—SCHOOL—Bd. Educ., Boro Hall, will not build 2 story, basement, brick, steel, plain found., Wood St. $150,000. Project abandoned. A. E. Dore, 173 Main St., Hackensack, archt. Noted Jan. 31.

N. Y. Brooklyn—SCHOOL—Bd. Educ., 500 Park Ave., New York, plans, W. C. Martin, supt. School Buildings, Flatbush Ave. extension and Concord St., 4 story, 179 x 235 ft. school, Winthrop and East 53rd Sts. $1,186,000.

N. Y., Brooklyn—SCHOOL and GYMNASIUM—Berkeley Institute 100 x 200 ft., brick, sandstone, 181 Lincoln Pl. $350,000.

N. Y., Long Island City — SCHOOL — Bd. Educ., 500 Park Ave., New York, plans by W. C. Martin, Flatbush Ave. extension and Concord St., Brooklyn, 4 story, 67 x 186 ft., brick, New York Blvd. and Gerrard Ave. $192,000.

N. Y., New York—SCHOOL and CONVENT—Church of St. Margaret plans by W. H. Jones, 26 Main St., Yonkers, 2 story, 72 x 130 ft., brick, 260th St. and Delafield Ave. $200,000.

N. Y., Richmond Hill—CHURCH—Church of Holy Child, T. A. Nummey, 8578 112th St., soon takes bids church, 86th Ave. from 111th to 112th Sts., $400,000. W. Boegel, 185 Madison Ave., New York, archt.

N. Y., White Plains—SCHOOL—Bd. Educ., plans by Starrett & Van Vleck, 393 7th Ave., New York, school, Fisher and Tibbetts Aves. $400,000.

N. C., Greensboro—COLLEGE—Bennett College for Negro Women, C. H. Ireland, treas. Bd. Trustees, science building, dormitory, $190,-000. Engineer and architect not selected.

N. C., Raleigh—SCHOOL—State School for Blind, Raleigh, plans by G. R. Berryman, Raleigh, school for negro deaf and blind, $150,000.

O., Akron—CHURCH—Goodyear Heights Congregation plans by H. W. Maurer, 5716 Euclid Ave., Cleveland, 1 story, brick, steel. $150,000.

O., Chillicothe—HIGH SCHOOL—Bd. Educ. plans by Garber & Woodward, 4 West 7th St., 3 story, basement, 150 x 187 ft., brick, concrete, incl. gymnasium, chemical laboratory. $300,000.

O., Cleveland—CONVENT—W. Koehl, archt., 1900 Euclid Ave., soon lets contract, 4 story, basement, 52 x 365 ft., brick, rem.-con., Stop 10½ Euclid Ave., for Sisters of Good Shepherd, East 30th St. and Carnegie Ave.

O., Portsmouth—HIGH SCHOOL—Bd. Educ. soon takes bids George D. Scudder, Junior High School, 2 story, basement, 125 x 195 ft., concrete, brick, stone, Court and 5th Sts. $275,-000. J. R. Wile, Portsmouth, archt.

O., Shaker Heights (br. Cleveland) — HIGH SCHOOL — Educ., J. W. Main, clk., Shaker Heights, plans by Hubbell & Benes Co., 4500 Euclid Ave., Cleveland, Senior High School, 2 story, basement, 360 x 450 ft., brick, steel, concrete, Aldersyde and Onaway Rds. $1,000,000. W. R. McCornack, 10000 Carnegie Ave., Cleveland, consult, engr.

Pa., Washington—CHEMISTRY—Washington & Jefferson College, plans by Hopkins & Dentz, 415 Lexington Ave., New York, 2 story, basement, brick, stone. $250,000.

R. I., Providence—SCHOOL—City, P. Building Dpt., plans by T. J. H. Pierce, City Hall, 2 story, basement, brick, steel addtiion, Nelson St. $150,000. Noted Nov. 15.

Tenn., Knoxville—CHURCH—Church Street Methodist Episcopal Church, 415 West Church St., bids late in July or August, Tennessee stone, Henley and Cumberland Sts. $650,000. Barber & McMurry, Tennessee General Bldg., archts. John Russell Pope, 542 5th Ave., New York, consult. archt. Noted Jan. 12, 1927.

Tex., Boling—SCHOOL—Boling Independent School Dist., C. S. Williams, pres., plans by Page Bros., Austin, school. $165,000 voted for same.

Text, San Antonio—HIGH SCHOOL—Los Angeles Heights Ind. School Dist., c/o G. F. Todd, secy., 316 Lee Hall St., plans by H. P. Smith, c/o Natl. Bank of Commerce Bldg., 3 story, brick, rein.-con., school, 38,000 sq.ft. floor space, incl. library, study hall, 800 seating capacity auditorium. $170,000. Noted May 23.

Utah, Logan—LIBRARY—Logan City plans by F. W. Hodgson, Logan, library. $175,000.

Utah, Ogden—DORMITORY—State Building Comn., Capitol Bldg., Salt Lake City, plans by Hodgson & McClahan, Eccles Bldg., girls dormitory for State School for Deaf and Blind. $160,000.

Utah, Salt Lake City—ENGINEERING—State Building Comn., Capitol Bldg., plans by Scott & Welsh, Dooley Bldg., rein.-con., brick, for University of Utah. $200,000.

Utah, Sandy—HIGH SCHOOL—Jordan School Bd., W. W. Wilson, pres., plans by Scott & Welch, Dooly Bldg., Salt Lake City, 3 story, 114 by 254 ft., brick, terra cotta, rein.-con., plain found., at Copperton. $250,000.

Ont., Hamilton—GYMNASIUM—Bd. Educ., R. H. Foster, secy., gymnasium. $150,000.

Ont., Wyoming — CHURCH — Presbyterian Church, C. F. Smith, secy., church.

Ont., Toronto — SCHOOL — Bd. Educ., 155 College St., soon takes bids 3 story, basement, 300 x 350 ft., brick, steel, stone, concrete, incl. gymnasium, auditorium. $250,000. C. E. C. Dyson, College St., archt.

Ont., Windsor—COLLEGIATE—City, F. J. Mitchell, finance controller, new collegiate. $850,000.

Que., Kenogami — CHURCH — A. Lapointe, pastor, plans by Lamontayne, Branard & Grand, Chicoutimi, new church. $150,000.

Que., LaTuque—CHURCH—A. Corbeil, pastor, new church. $200,000.

Que., Montreal — CHURCH — A. L'Heureaut, pastor, 8815 Henri Julien St., plans by L. Lemieux, 1260 University St., church. $350,000.

Que., Montreal—CHURCH—A. Lussier, pastor, 10174 Des Ormes St., church, for Parish of St. Paul de LaCroix. $350,000.

Que., Montreal — CHURCH — A. Perrauet, pastor, 2015 Beaukien St. E., church, for Parish of St. Mark. $300,000.

Que., Montreal — CONVENT — L. Lemieux, 1260 University St., 5 story, 85 x 200 ft., rein.-con., brick, steel, stone. College St. $300,000.

Que., Quebec — COLLEGE — Jesuit Fathers college. $350,000.

Bids Asked

Ia., Estherville—HIGH SCHOOL—July 12, by Bd. Educ., Junior High School, 2 story, part basement, 130 x 200 ft., rein.-con., brick, stone, plain found., $160,000. Keffer & Jones, 202 Masonic Temple, Des Moines, archts. Noted June 20.

Mass., Medford (br. Boston)—HIGH SCHOOL—July 6, by City, School Building Com., City Bldg., 3 story, basement, 65 x 115 ft., and 65 x 240 ft., brick, additions to Senior High School, plain founds., Forest St., $600,000: heating and ventilation work, $25,000. Former bids rejected. C. B. Dunham, 6 Beacon St., Boston, archt. R. D. Kimball Co., 6 Beacon St., Boston, engrs. Noted June 13.

Mass., Springfield — SCHOOL — Hebrew Free School Assn., N. E. Goldstein, **103 Bridge St.**, taking bids 2 story, basement, 60 x 100 ft., brick, Chestnut St. $150,000. J. W. Foster, 105 Bridge St., archt. Noted Apr. 25.

N. J., East Orange—HIGH SCHOOL—July 10, by Bd. Educ., 19 Winans St., Junior High School, Elmwood Ave. between Eppirt and Burnet Sts. Guilbert & Betelle, Chamber of Commerce Bldg., Newark, archts. Noted June 13.

N. J., Jersey City—CHURCH and SCHOOL—July 5, by E. G. Perrot, archt., 130 West 42nd St., New York, general contract 2 story, basement, brick, steel, Lafayette and Van Horn Sts., for Roman Catholic Church of the Assumption. $200,000.

N. J., Newark—SCHOOL—Bd. Educ., City Hall, bids about Aug. 1, general contract 2 story, basement, brick, steel, rein.-con., plain found., Ivy St. between Richelieu Terrace and Elloy Ave. $350,000. Simpson & Rolston, 45 Walnut St., archts. Noted Mar. 14.

N. Y., Flushing—SCHOOL—July 18, by W. C. Martin, archt. and supt. School Buildings, Flatbush Ave. extension and Concord St., Brooklyn, general ,contract or general contract and electrical work P. S. 154, 162nd St. from 75th Rd. to 75th Ave., Flushing-Hillcrest, for Bd. Educ., 500 Park Ave., New York.

N. Y., Hollis (br. Jamaica)—SCHOOL—July 18, by W. C. Martin, archt. and supt. School Building, Flatbush Ave. extension and Concord St., Brooklyn, general contract or general contract and electrical work P. S. 135, 89th Ave., 207th and 208th Sts., for Bd. Educ., 500 Park Ave., New York. Noted Apr. 4.

N. Y., Kenmore (br. Buffalo)—SCHOOL—July 15, by Village of Kenmore, at High School, 2 story, brick, steel, Colvin and Crosby Sts. $300,000. B. C. Buell, 547 Franklin St., Buffalo, archt. Noted June 13.

Okla., Oklahoma City—HISTORICAL—Aug. 1, by Bd. Affairs, Capitol Bldg., 4 story, basement, 88 x 220 ft., brick, rein.-con., plain found., Lincoln Blvd. $500,000. Layton, Hicks & Forsythe, Braniff Bldg., archts. Noted June 6.

Pa., Pittsburgh—CLINIC and DISPENSARY—University of Pittsburgh, Bigelow and Parkman Sts., bids about Sept. 1, Falk Clinic, 5 story, 90 x 160 ft., brick, stone, near 5th and Lothrop Sts. $950,000. E. P. Mellon, 250 Madison Ave., New York, archt.

W. Va., Charleston—SCHOOL—July 9, by Bd. Educ., 18 room school, incl. auditorium, Orange St. near West Ave. Warne, Tucker, Silling & Hutchison, Masonic Bldg., archts. Noted Feb. 7.

Bids Received

Pa., Harrisburg — EDUCATIONAL — State Dpt. Property & Supplies, Capitol Bldg., June 25, general contract Educational Building, Capitol Hill, from Nelson & Pedley Constr. Co., 1512 Chestnut St., Phila., $3,430,000; heating, from Riggs Distler Co., 216 North Calvert St., Baltimore, Md., $174,638; plumbing, from J. T. Evans, Wilkes-Barre, $121,622; electrical work, from Keystone Eng. Co., Reading, $225,-000; elevators, from Otis Elevator Co., 502 North 19th St., Phila., $195,535. Noted June 20.

Contracts Awarded

Ala., Bessemer—CHURCH—Trustees Methodist Episcopal Church, 2 story, basement, 75 x 125 ft., brick, stone, to W. L. Coston, Bessemer, $200,000.

Del., Wilmington—SCHOOL—Church Building Com., St. Elizabeth Catholic Church, 809 South Broome St., general contract 2 story, basement, brick, steel, plain found., to H. J. Homan Co., Inc., 28th and Cherry Sts., Phila., Pa. Est. $150,000. Noted May 9.

Ill., Chicago—LIBRARY—Loyola University, Loyola Ave., general, heating and plumbing contracts 2 story, brick, to M. Raven Co., 326 West Madison St. Est. $300,000. Noted Feb. 21.

Ill., Chicago—MUSEUM—South Park Comrs., Cottage Grove Ave., reconstructing old Fine Arts Building into Julius Rosenwald Museum, 57th St. and Jackson Park, connecting Grant and Lincoln Parks, to R. C. Wieboldt Co., 1412 Washington Blvd., $2,649,000. Noted May 30.

Ill., Evanston — NURSES HOME — H. B. Wheelock, archt., 64 West Randolph St., general contract 4 story, basement, 168 x 183 ft., rein.-con., brick, steel, stone, to Schmidt Bros. Constr. Co., 22 East Huron St., Chicago, for Evanston Hospital. Est. $700,000.

Ill., Jacksonville — DORMITORY — Illinois Womens College, C. P. McLean, pres., 3 story, 90 x 180 ft., rein.-con., Georgian brick, to W. C. F. Kuehne, Rantoul, Ill. Est. $200,000. Noted May 30.

Ill., Maywood—HOME—Roberts & Roberts, archts., 105 North Clark St., general contract 3 story, 50 x 65 ft., and two 37 x 84 ft. wings, brick, stone, to G. Thompson & Sons Co., 30 North La Salle St., for Baptist Old Peoples Home, Randolph St. and 4th Ave. Est. $275,000. Noted Aug. 2.

Ind., Cutler—HIGH SCHOOL—School Comrs. Carroll Co., general contract 2 story, basement, brick, steel, stone, tile, to R. O. Sharp, Camden. Est. $150,000.

Ind., Gary—HIGH SCHOOL—School Comrs., general contract Roosevelt High School, 3 story, basement, brick, rein.-con., 25th and Harrison Sts., to H. B. Olney, 1200 East Chicago Ave., East Chicago. Est. $900,000. Noted June 6.

Ind., Michigan City—SCHOOL—School Comrs., general contract Canada Grade School, 2 story, basement, brick, steel, to H. Koellin, Ledbetter Bldg., Michigan City. Est. $150,000. Noted June 6.

Ind., South Bend—SCHOOL—School Comrs., general contract brick, steel, to J. I. Barnes, Culver. Est. $150,000. Noted Apr. 11.

Ia., Des Moines—HIGH SCHOOL—Des Moines Independent School Dist., c/o G. T. Carton, secy., general contract 2 story, basement, 118 x 132 ft., rein.-con., brick, stone addition, to Sugarman Constr. Co., 725 Tuttle St., $214,-317; heating and plumbing, to Van Dyck Plumbing & Heating Co., 929 6th St., $49,297. Noted June 6.

Me., Auburn—CONVENT—St. Louis Roman Catholic Church, J. M. Chataynon, pastor, 3 story, basement, brick, steel ,plain found., to L. Malo & Sons, 51 East St., Lewiston. Est. $150,000. Noted Jan. 10.

Me., Madison—HIGH SCHOOL—Town, H. A. Johnson, chn. building com., Junior High School, 2 story, basement, 65 x 125 ft., brick, stone, plain found., to J. R. Patridge, 250 State St., Augusta. Est. $150,000. Noted June 20.

Md., Paltimore—CHURCH—Buckler & Fenhagen, archts., 25 North Charles St., 2 story, irregular shaped, stone, brick, to L. L. Chambers, 36th St. and Roland Ave., for St. Mathews Evangelical Lutheran Church, $150,000. Noted May 16.

Md., Baltimore—SYNAGOGUE—Agudas Achim Anshe Sphard Congregation, P. Mizen, pres., 4015 Park Heights Ave., 1 story, auditorium, brick, steel, rein.-con., limestone marble, tile, terrazza, plain found., to B. H. B. Ennis, 1933 East 31st. Est. $150,000. Noted Apr. 4.

Mass., Hingham—CHURCH—First Baptist Church, C. E. Southard, pastor, 26 Elm St., altering and constructing 2 story, basement, brick, stone addition, plain found., incl. new spire, to J. H. Tracy, Downer Ave. Est. $150,-000. Noted Mar. 28.

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Buildings—Educational, Religious (Cont.)

Mass., Winthrop (br. Boston)—CHURCH—First Methodist Church, c/o Froham, Robb & Little, archts., 140 Boylston St., Boston, 1 story, basement, brick, stone, plain found., Metcalf Sq. and Winthrop St., to L. W. Oakes, Inc., 100 Halleck St., Boston. Est. $150,000. Noted Jan. 10.

Miss., Oxford — UNIVERSITY — Mississippi State Building Comn., c/o W. C. Trotter, secy., State House, Jackson, general contract graduation building, hospital and school, rein.-con., brick, steel, stone, to Garber & Dickson, Jackson, $350,947; plumbing and heating, to A. B. Hayden, Pass Christian, $41,450. Noted May 30.

Mich., Port Huron—HIGH SCHOOL—J. C. Stone, bus. mgr., Bd. Educ., 2 story, basement, 61 x 140 ft. school, 50 x 75 ft. gymnasium, brick, steel, rein.-con., plain found., to H. Evers & Co., Grand Rapids. Est. $150,000. Noted May 30.

Mo., St. Louis — SCHOOL — Bd. Educ., 911 Locust St., general contract (1st unit) Vocational School, 2 story, basement, 91 x 166 ft., rein.-con., brick, stone, to Dunham Constr. Co., 316 Chemical Bldg., $221,900; heating and ventilating, to Lahey Heating & Ventilating Co., Merchants Exch. Bldg., $33,647. Noted May 30.

N. J., Cranford—SCHOOL and CHURCH—Poggi & Bragdon, archts., 275 Morris Ave., Elizabeth, general contract 2 story, basement, 105 x 120 ft., brick, steel, plain found., to Hugh Montague & Son, Inc., 15 Exchange Pl., Jersey City, for St. Michaels Roman Catholic Parish, J. McDonald, pastor, 18 Alden St. Est. $175,000. Noted May 23.

N. J., Jersey City—CHURCH—R. W. Sailor, archt., 78 Montgomery St., general contract 2 story, basement, brick, steel, plain found., to P. F. Redfern & Son, 569 Jackson Ave., for Christ Evangelical Lutheran Church, c/o architect. Noted June 6. Plumbing, to A. G. Totten, 604 Ocean Ave.; heating, to Diehl & Gross, 733 Communipaw Ave.; electrical work, to Stradel Bros., 122 Jackson Ave.

N. J., New Brunswick—FRATERNITY—Phi Gamma Delta Fraternity, general contract 3 story, basement, brick, steel, plain found., to T. H. Flynn, 344 George St. Est. $150,000.

N. J., North Plainfield (mail Plainfield)—SCHOOL—V. J. Eck, archt., 12 Broad St., Red Bank, general contract 2 story, basement, brick, steel, plain found., to A. Milne, 15 Watchung Ave., Plainfield, for St. Joseph's Roman Catholic Church, 43 Manning Ave. Est. $150,000. Noted June 20.

N. J., Nutley—CHURCH—Armstrong & De Gellecke, archts., 122 East 25th St., New York, general contract 1 story, basement, brick, steel, plain found., to J. B. Roberts & Co., 949 Bway., New York, for Nutley Methodist Episcopal Church, c/o architect. Noted May 9.

N. Y., Harrison—SCHOOL—Free School Dist. 6, school addition, Fieldstone St., to M. Mezzullo, 132 Pearl St., Port Chester. Est. $161,000.

O., Columbus—ART GALLERY—Columbus Gallery of Fine Arts, 478 East Broad St., 1 story, basement, 100 x 200 ft., brick, stone, concrete, steel, to Boyajohn & Barr, 299 North Park St., $430,000. Richards, McCarty & Bulford, 584 East Broad St., archts. Noted June 6.

Pa., Pittsburgh—NURSES HOME—Sisters of St. Francis, 45th St., substructure for nurses home, Calvin St., to A. & S. Wilson Co., 700 Bowman Bldg. Noted June 13.

Tex., Humble—HIGH SCHOOL—Humble Ind. School Dist., H. D. McDonald, secy., general contract 2 story, 144 x 177 ft., brick, stone, steel joists, hollow tile, concrete found., to C. W. Ennis, 709 Stuart Ave., Houston. $124,950. Noted Mar. 28.

Wis., Milwaukee—HOME for AGED—C. J. Smith, archt., 97 East Wisconsin Ave., 2 story, 88 x 140 ft., brick, tile, to Selzer-Ornst Co., 192 4th St., for Federated Jewish Charities. Noted May 23.

Ont., Belleville—COLLEGE—F. Killian, St. Michaels College, altering and constructing 2 story, stone addition, to Ferguson Constr. Co., 243 Confederation Life Bldg., Toronto. $160,000.

Ont., Ottawa — CHURCH — Parish Saint Therese, stone, steel, plain found., Cartier St., to Ross-Megher, Elgin St., $122,000. Noted Mar. 14.

Ont., Ottawa—COLLEGE—College of the Little Flower, 4 story, basement, 86 x 100 ft., brick, plain found., Echo Dr., to Doran Contg. Co., 67 Queen St., $125,000. Est. $500,000.

Ont., Sandwich—SCHOOL—Bd. Educ., W. J. McArthur, chn., 2 story basement, 65 x 135 ft., concrete, brick, stone, steel, to Border Constr. Co. Ltd., Imperial Bldg., Walkerville, $177,000. Noted May 23.

Ont., Toronto—CHURCH—Church of Blessed Sacrament, Yonge St., general contract, 1 and 2 story, basement, 60 x 158 ft., stone, concrete found. to Witchall & Sons, 156 St. Helens Ave., plumbing and heating, to W. J. McGuire Ltd., 91 Jarvis St. Est. $165,000. Noted June 20.

Ont., Windsor — SYNAGOGUE — Shaar Hashamayim, c/o M. Nathanson, 210 Victoria Ave., chn. building com., 75 x 115 ft., brick, steel, rein.-con., to N. R. Ibbetson Co., Walkerville. Est. $200,000.

Que., Quebec City — CHURCH — Dominican Fathers, 329 Grande Allee, concrete, brick, steel, to F. X. Lambert, St. Anne de la Pocotiere Ave., $300,000. Noted May 30.

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Federal Government Work

Proposed Work

La., New Orleans—WIRE—U. S. Engineer Office 1,500,000 lin.ft. galvanized wire strand.

Md., Baltimore—DREDGING—U. S. Engineer Office, in Baltimore Harbor and channels.

Mississippi—DREDGING—U. S. Engineer Office, Mobile, Ala., received no bids maintenance dredging 1,250,000 cu.yd. in Pascagoula River and Mississippi Sound Channels. Noted May 30.

Tex., Galveston—JETTY—U. S. Engineer Office, repairing Sabine Pass East Jetty, incl. 65,000 tons stone.

Bids Asked

Calif., San Francisco—HOSPITAL—July 20, by Constructing Quartermaster, constructing hospital ward, Letterman General Hospital.

D. C., Wash.—ROOFING—July 18, by A. L. Flint, general purch. agt., Panama Canal corrugated asbestos-cement composition or protected metal roofing material and laying accessories and skylights.

D. C., Wash.—TENDER—July 25, by Commissioner Bureau Lighthouses, Tender Violet, machinery.

Ga., Atlanta—INFIRMARY, etc.—Aug. 6, by U. S. Veteran's Bureau, Arlington Bldg., Wash., D. C., constructing infirmary recreation building, officers duplex quarters, roads, etc. at U. S. Veteran's Hospital; adv. E. N.-R. July 4.

Idaho—ROAD—July 12, by Bureau P. Rds., grading, paving 10.15 mi. Ketchum-Clayton Rd., Natl. Forest Rd., Custer Co. B. J. Finch, dist. engr.

Louisiana—EARTHWORK—July 13, by U. S. Engineer Office, foot Prytania St., New Orleans, 13,880,000 cu.yd. earthwork under continuing contracts on Protection Levees, Atchafalaya Basin, New Orleans River Dist.

Louisiana—BRIDGE—July 30, by Dpt. Agriculture, Wash., D. C., structural steel swing bridge with timber deck over Bayou Teche, at Iberia Livestock Experiment Station. Former bids rejected; adv. E. N.-R. July 4.

Mississippi—LEVEE WORK—July 22, by U. S. Engineer Office, P. S. Box 667, Vicksburg, 14,195,000 cu.yd. levee work on Mississippi River.

New Jersey—DREDGING—July 31, by U. S. Engineer Office, 39 Whitehall St., New York, removing 92,600 cu.yd. ledge rock, dredging 101,000 cu.yd. earth or overburden in Hackensack River; adv. E. N.-R. July 4.

N. J., Oceanport—QUARTERS—July 24, at office Constructing Quartermaster, Fort Monmouth, five 4 family apartments, bachelor officers quarters building; adv. E. N.-R. July 4. Noted May 2.

Pa., Fort Mifflin (mail Phila.)—MASTS, etc.—Spec. 5633—July 10, by Bureau Yards & Docks, Navy Dpt., Wash., D. C., steel masts, ground system for lighting protection, Naval Ammunition Depot.

Tex., Galveston—BULKHEAD—July 29, by U. S. Engineer Office, 1,050 lin.ft. steel sheet pile bulkhead on Pelican Spit, Galveston Channel; adv. E. N.-R. July 4. Noted June 13.

Utah—ROAD—July 12, by Bureau P. Rds., Dpt. Agriculture, Ogden, grading, paving 4.15 mi. Heber-Fruitland Rd., Natl. Forest Park, Wasatch Co. B. J. Finch, Ogden, dist. engr.

Va., Harrisburg—REMODELING, etc.—July 29, by Treas. Dpt., at office Supervising Archt., Wash., D. C., remodeling, enlarging U. S. Post Office, J. A. Wetmore, acting superv. archt.; adv. E. N.-R. July 4.

Alaska, Sitka—HEATING SYSTEM—July 24, by Treas. Dpt., at office Supervising Archt., Wash., D. C., heating system, at U. S. Custom House.

Bids Received

Calif., Pasadena—ADDITIONS—Treas. Dpt., at office Supervising Archt., Wash., D. C., June 24, altering and constructing addition to U. S. Post Office, from W. C. Crowell, Pasadena, $1,117. Noted May 16.

Ga., Fort Benning—REPAIRING—Quartermaster Generals Office, rein.-con. paving, drainage, Vibbert Ave. and Lampkin Sts., also retaining wall, sewers in hospital area, from Davis Constr. Co., Walton Bldg., Atlanta, $94,500 and $31,000 respectively.

Ia., Knoxville — ACUTE BUILDING — U. S. Veterans Hospital, Arlington Bldg., Wash., D. C., June 25, hospital, from Ganley Bros. Co., 508 Endicott Bldg., St. Paul, Minn., $237,500; elevators, from Strandberg Bros., 608 South Dearborn St., Chicago, Ill., $4,350. Noted May 30.

La., Carville—FENCE, etc.—Treas. Dpt., at office Supervising Archt., Wash., D. C., June 24, fences, approaches, from LaBranc-Barbay Co., St. Gabriel, $28,787. Noted June 20.

Maine—ROAD—Dpt. Interior, Natl. Park Service, Troy, N. Y., June 22, improving Cadillac Mt. Project 1-A, Arcadia Nat. Park, Desert Island, from J. H. Kuff, Rumford, $159,310. Noted June 13.

Nev., Hawthorne—ADMINISTRATION, etc.—Spec. 5835—Bureau Yards & Docks, Navy Dpt., Wash., D. C., June 26, buildings at Naval Ammunition Depot, from Mitty Bro., 412 West 6th St., Los Angeles, Calif., $1,092,000. Noted May 23.

New Jersey—DREDGING—U. S. Engineer Office, 30 Whitehall St., New York, June 25, 540,700 cu.yd. Passaic River, from Trimont Dredging Co., 10 State St., Boston, Mass.

N. J., Oceanport—PUMPING EQUIPMENT—Constructing Quartermaster, from Ranson & Anderson, 136 Liberty St., New York, N. Y. sewage pumping equipment, pump shelter. Items (1) $1,350 (2) $1,250 and (3) $1,750. Noted June 6.

N. Y., Mineola — HANGARS — Constructing Quartermaster, Mitchell Field, June 14, various buildings, from D. M. W. Constr. Co., Avenue P, Brooklyn, $492,000. Noted May 30.

Pa., Carlisle—SHOP—Constructing Quartermaster, June 20, wing to Shop Building O, from J. H. Greiner Co., Lebanon, $53,980. Noted June 6.

Tex., Fort McIntosh (mail Laredo)—PUMPING STATION—Constructing Quartermaster, from H. B. Zachery, Laredo, sewage booster pump station $5,975, diversion manhole $9,210, sewage pumping equipment $3,650, 1,000 ft. 6 in. discharge line at $2 per cu.yd. Noted June 6.

Contracts Awarded

Ariz., Tucson — POST OFFICE and COURT HOUSE — Treas. Dpt., at office Supervising Archt., Wash., D. C., 4 story, basement, post office and court House, to R. E. McKee, El Paso, Tex., $414,300. Noted June 26.

California—ROAD—C. H. Sweetser, dist. engr. Bureau P. Rds., 461 Market St., San Francisco, grading Placerville-Lake Tahoe National Forest Rd., El Dorado Co., to G. E. Finnell, Sacramento, $243,530. Noted June 6.

Idaho — ROADS — Bureau P. Rds., Odgen, Utah, grading North Fork Fayette National Forest Rd., Valley Co., to J. A. Tertling & Sons, Moscow, $106,262; 3.7 mi. Teton Hy., Teton Co., to Wheeler & England, Moreland, $36,818; 3.7 mi. Salmon-Montant Line National Forest Rd., Lemhi Co., from Union Constr. Co., Ogden, Utah, $34,963. Grand total $178,043. Noted June 13.

Ill., Champaign—REMODELING—Treas. Dpt., at office Supervising Archt., Wash., D. C., remodeling, enlarging post office, to H. Lloyd Bldg. & Constr. Co., Syndicate Trust Bldg., St. Louis, Mo., $22,145. Noted June 20.

Kansas—EARTHWORK—U. S. Engineer Office, Memphis, Tenn., 155,000 cu.yd. earthwork in Lawrence, Dutton, Gibbons, Islett-Blackburn, Rosenthal, Nixon, Edwards-Marsh-Bell, Nation, Wikle, Sheltz, Heath, and Linden Levee Dists. on Neosho River, in vicinity of Chanute, Erie and St. Paul, to F. D. Harvey Co., Memphis, Tenn., at $0.46 per cu.yd. Noted May 30.

Me., Camden—DREDGING—U. S. Engineer Office, Custom House, Boston, in Camden Harbor, to Bay State Dredging & Contg. Co., 62 Condor St., East Boston, Mass., $34,100. Noted June 13.

Minn., Hastings—LOCK GATES—U. S. Engineer Office, St. Paul, upper and low lock gates at Hasting Lock and Dam, to Dravo Contg. Co., Dravo Bldg., 302 Pennsylvania Ave., Pittsburgh, Pa., $110,935. Noted Apr. 4.

N. J., Somerset Hills (mail Titusville) — PLUMBING and HEATING — U. S. Veterans Bureau, Arlington Bldg., Wash., D. C., plumbing and heating, to T. E. Thomas Plumbing & Heating Co., Ogden, Utah, $300,183. Noted June 27.

N. C., Asheville — POST OFFICE, etc. — Treas. Dpt., at office Supervising Archt., Wash., D. C., 3 story, basement post office and court house, to Murch Bros. Constr. Co., Railway Exch. Bldg., St. Louis, Mo., $544,300. Noted June 20.

O., Cincinnati—PIERS—U. S. Engineer Office, June 14, constructing set ice piers in Ohio River, to General Contg. Corp., 714 Columbia Bldg., Pittsburgh, Pa., $78,758. Noted June 6.

O., Marietta—STORAGE BUILDING—U. S. Engineer Office, Huntington, W. Va., 3 story, basement storage building, to Ohio Valley Constructors, Inc., 614 Chamber of Commerce Bldg., Cincinnati, O., $48,484. Noted May 9.

Oregon—ROAD—U. S. Engineer Office, Post Office Bldg., Portland, grading 5.6 mi. Elgin Hy., Wallowa Co., to J. A. Tertelling, Medford, (concrete pipe) $45,075.

Ore., Vale — CANAL — Bureau Reclamation, Dpt. Interior, 16.5 mi. main canal, Vale Project, to W. H. Puckett Co., Boise, Idaho, $495,470. Noted June 27.

Tenn., Memphis—SHOP and WAREHOUSE—U. S. Engineer Office, 8 shop and warehouse buildings on west bank Mississippi River, opposite here, to B. W. Cocke & Sons, 63 South 3rd St., $118,584. Noted June 6.

Virginia and North Carolina—DREDGING—U. S. Engineer Office, 1,575,000 cu.yd. in Lower North Landing River-Currituck South, to Arundel Corp., Pier 2, Pratt St., Baltimore, Md., $99,225. Noted June 27.

Wash., American Lake—HOSPITAL—U. S. Veterans Bureau, Arlington Bldg., Wash., D. C., building and utilities at U. S. Veterans Hospital, to L. Dioguardi, 30 West Poplar Ave., San Mateo, Calif., $210,950; additions to refrigerating plant, to York Ice Machine Co., 2222 Arch St., Phila., Pa., $9,995. Noted June 26.

Wash., Fort Lewis—ROADS—Constructing Quartermaster, roads, walks, drainage in new post hospital, to Anderson & Liljebeck, Tacoma, $23,500. Noted May 8.

Wash., Seattle—BARRACKS—Spec. 5788—Bureau Yards & Docks, Navy Dpt., Wash., D. C., at Naval Air Station, to Fitton & Evergreen, Seattle, $165,800 (300 days). Noted May 23.

Unclassified

Proposed Work

TUNNEL — California — Hy. Dist. Alameda Co. (Oakland) and Contra Costa Co. (Martinez) two barrel low-level tunnel between above counties, tunnel and ventilating system $2,500,000, connection west approach $900,000, Chabot Rd. $85,000, tunnel road connection $85,000, east approach $920,000, Mountain Blvd. connection $70,000, engineering $359,200. Total $4,919,200. G. A. Posey, surv. former and R. R. Arnold, surv. latter counties.

LIGHTING SYSTEM—Monterey, Calif.—City, lighting system with underground system in Tyler St. and Del Monte Ave. $25,000 or more. H. D. Severance, city engr.

WAR MEMORIAL—Hartford, Conn.—City, War Memorial Com. plans by Smith & Bassette, 36 Pearl St., and P. Cret, 112 South 16th St., Phila., Pa., memorial mounment, 90 ft. high, and 200 ft. base. $500,000.

SWIMMING POOL, etc.—New Canaan, Conn.—New Canaan Country Club, 35 x 75 ft. swimming pool and 10 x 35 ft. wading pool, concrete, chlorinating system. Engineer not selected.

UNDERPASS—Missouri—State Hy. Comn., Jefferson City, and St. Louis-San Francisco Ry., F. G. Jonah, ch. engr., Frisco Bldg., St. Louis, preliminary plans underpass on U. S. Hy. 66, at Mile Post 9, on above railway out of St. Louis, St. Louis Co. $50,000.

RIVER TERMINAL—Boonville, Mo.—Boonville Chamber of Commerce, H. A. Slifer, secy. mgr., preliminary plans interchange river terminal to serve barges on Missouri River, railroads.

TRAFFIC LIGHTING SYSTEM — Garfield, N. J.—Bd. City Council, City Hall, overhead traffic lighting system, $25,000. A. Noack, 236 Main St., Hackensack, city engr.

GRADE CROSSING ELIMINATION — Port Henry, N. Y.—Delaware & Hudson R.R. Co., J. MacMartin, ch. engr., Albany, eliminating grade crossing on Currier-Corners-Fort Amherst County Hy., 3.5 mi. south Port Henry Station. $123,000.

POWER LINE—North Carolina—Southern Public Utilities Co., Charlotte, power line from Elkin to Booneville, East Bend., Yadkinville and Smithtown, incl. erecting towers, stringing wires carrying 6,600 volts. $80,000.

TRANSMISSION LINES — Oklahoma — Oklahoma Gas & Electric Co., Insurance Bldg., Oklahoma City, preliminary plans 66,000 volt transmission lines from point near Harrah Station to White Eagle, $100,000; from White Eagle to Enid, $60,000; from Cleo to Alva, $75,000; from Enid to Cleo, $100,000. Byllesby Eng. Co., 231 South La Salle St., Chicago, Ill., engr.

GAS SYSTEM—Heavener, Okla.—G. F. Collins granted franchise natural gas system. $30,000.

TRANSMISSION LINE — Hydro, Okla. — Southwest Light & Power Co., Braniff Bldg., Oklahoma City, Z. Z. Rogers, vice-pres., electric transmission line from near Hinton to Hydro, and distribution system in Hydro. $30,000. Private plans.

GENERATOR UNIT—Shattuck, Okla.—Oklahoma Gas & Electric Co., Insurance Bldg., Oklahoma City, 750 kw. generator unit, to power plant, $25,000. Byllesby Eng. Co., 231 South La Salle St., Chicago, Ill., engr.

COMFORT STATION—Providence, R. I.—City, Park Dpt., E. D. Miller, 1 story, concrete, brick comfort station, at Roger Williams Park. $25,000 or more. Engineer not selected.

GAS PIPE LINE—Texas—West Texas Gas Co., Independence, Kan., natural gas pipe line between Tahoka and Brownfield. $125,000. Private plans.

GAS SYSTEMS — Texas — Community Gas Co., Dallas and Jacksboro, granted franchise to supply natural gas system at Jacksboro, Bagwell, Detroit and Blossom, also laying 32 pipe line between towns mentioned above. Private plans.

PIPE LINE—Texas—Lone Star Gas Co. Dallas and Desdemona, 24 mi. 16 in. pipe line from Ranger to point near Moran. Probably use own forces. Private plans.

UNDERPASS—Ft. Worth, Tex.—City, O. E. Carr, mgr. and Chicago, Rock Island & Pacific R.R. Co., C. A. Morse, ch. engr., Chicago, Ill., bids after July 10, rein.-con. underpass, at East 4th St. at railway crossing. $150,000. Noted Nov. 29.

TRANSMISSION LINES—St. John, N. B.—New Brunswick Electric Power Comn., hydro extensions Manchester Corners to Gagetown, $108,000; Suner Corner to Waterford, $11,251; Gilbert to Moncton, $14,000; Alhart Co. $60,000.

Bids Asked

TRANSFORMERS—Detroit, Mich.—July 17, by J. W. Reid, comr. P. Wks., 24,000 volt three phase transformers for Connors Creek Storm Water Pumping Sta., Jefferson and Clairpointe Aves. $50,000. P. A. Fellows, City Hall, engr.

FIELD HOUSE—Columbia, Mo.—July 8 (extended date), by Bd. Curators University of Missouri, L. Cowan, secy., c/o C. L. Brewer, athletic dir., 2 story, 160 x 250 ft., rein.-con., stone field house, incl. dirt track, basketball court. $225,000. Jamieson & Spearl, Arcade Bldg., St. Louis, archts. Noted June 27.

PLAYGROUND—Paterson, N. J.—July 11, by Bd. Recreation, Comrs., City Hall, retaining walls, grading, surfacing new playground, Summer, Harrison and Fulton Sts. $25,000. H. J. Harder, city engr.

SWIMMING POOL—Seaside Park, N. J.—E. H. Schmieder, archt., 1109 3rd Ave., Spring Lake, bids about July 15, 1 story, 75 x 100 ft. concrete, glazed brick swimming pool, one hundred 1 story, frame bath houses, 500 locker rooms, 1 story, brick stores, for Arlington Beach Bathing Co., c/o architect. $150,000. Noted June 6.

SWIMMING POOL — West Orange, (br. Orange), **N. J.**—Conable-Smith & Rawley, archts., 46 West 24th St., taking bids, 75 x 100 ft., concrete, glazed brick swimming pool, 2 story, brick, steel pavilion, for H. S. Scarritt, c/o architects. $50,000.

ELEVATOR — Albany, N. Y. — July 18, by Dpt. Health, Div. Laboratories & Research, electrical elevator, West Wing, State Dpt. Health; adv. E. N.-R. July 4.

SUBWAY—Brooklyn, N. Y.—July 12, by Bd. Transportation, J. H. Delaney, chn., 49 Lafayette St., New York, constructing Route 107, Sect. 6, Repair Transit R.R. along and under Schermerhorn St. and Lafayette Ave. from Bond to St. Felix Sts. Noted June 6.

HEATING, etc.—Buffalo, N. Y.—July 17, by Commissioner Dpt., Mental Hygiene, Capitol, Albany, heating, electrical work, service connections, reception building, Buffalo State Hospital; adv. E. N.-R. July 4.

ENTRANCE DRIVE—Kings Park, N. Y.—July 10, by Dpt. Mental Hygiene Capitol, Albany, entrance drive to Kings Park State Hospital. F. W. Parsons, comr.; adv. E. N.-R. July 4.

PARK IMPROVEMENTS—Long Island City, N. Y. — July 9, by Park Bd., W. R. Herrick, comr. Dpt. Parks, Arsenal Bldg., Central Park, New York, improving hall spaces, 25th Ave. (Hoyt Ave.) and 2nd Ave., Astoria; also general improvement Upland Park, Queens Boro.

ESCALATOR WELL, ESCALATOR—Phila., Pa.—July 12, by Dpt. City Transit, C. E. Meyers, dir., City Hall Annex, escalator well, passage way, City Hall Station, North Plaza City Hall, Contr. 179; escalator, Contr. 189.

SWIMMING POOL—Phila., Pa.—July 8, by Dpt. P. Wks., Bureau Recreation, 40 x 120 ft. rein.-con. swimming pool, Tacony and Levick Sts. W. J. Covell, City Hall Annex, archt.

OIL TANKS—Toronto, Ont.—See "Contracts Awarded."

Contracts Awarded

OVERHEAD CROSSING—Barstow, Calif.—State Hy. Dpt., Sacramento, steel truss overhead crossing over Atchison, Topeka & Santa Fe Ry., San Bernardino Co., to Lynch-Cannon Constr. Co., Chapman Bldg., Los Angeles, $155,381. Noted Mar. 7.

PROJECTION ROOM, STAGE, etc.—Culver City, Calif.—Metro-Goldwyn-Mayer Studios, 200 x 215 ft., rein.-con., stage building, 84 ft. high, and 2 story, 30 x 60 ft. laboratory and projection room., to Austin Co., 777 East Washington St., Los Angeles.

GAS PIPE LINE—Colorado—Colorado-Wyoming Gas Co., c/o C. J. Shorthorn, Boulder, 8 and 10 in. steel pipe from Littleton to Boulder, to Morrison & Gates, Cooper Bldg., Denver, $1,000,000.

TANK—New Haven, Conn.—Standard Oil Co., 134 Forbes Ave., 40 x 100 ft., steel tank on steel, concrete base. $25,000. Owner builds. Private plans.

SWIMMING POOL—Westport, Conn.—Westport Y. M. C. A., T. H. Leonard, secy., 1 story, 40 x 80 ft., brick addition to house swimming pool, to Hewlett Co., 886 Main St., Bridgeport. Est. $75,000. Noted May 16.

SWIMMING POOL—Ottumwa, Ia.—Park Bd., c/o P. P. Phillips, comr., 125 x 250 ft. concrete swimming pool, hollow tile, veneer, brick bathhouse, to Meir Bros., Ottumwa, $20,872; plumbing, to W. Guest, Ottumwa, $5,425.

STEEL TANKS—Cambridge, Mass.—Lever Bros. Co., 164 Bway., four 1,000,000 lb. steel tanks, to Pittsburgh Des Moines Co., 429 Penn Ave., Pittsburgh, Pa. Noted Apr. 25.

HEATING WORK—Brockport, N. Y.—Commissioner Dpt. Education, Education Bldg., Albany, June 4, heating work, new boilers, for Brockport State Normal School, to Perdue & Gleockler, 65 Broad St., Rochester, $20,780. Noted May 30.

HEATING WORK—Comstock, N. Y.—Dpt. Correction, 11 North Pearl St., Albany, heating work, boilers for Great Meadows Prison, to A. D. Granger Co., 15 Park Row, New York, $22,991. Noted May 23.

SUBWAY—New York, N. Y.—Bd. Transportation, J. H. Delaney, chn., 49 Lafayette St., Sect. 6, Route 106, Rapid Transit R.R., to DeMarco & Reimann, White Plains, $6,701,032. Noted June 13.

DOCKS—Toledo, O.—Hocking Valley R.R., W. Michel, ch. engr., Columbus, docks, dredging slips, to Great Lakes Dredge & Dock Co., Williamson Bldg.; ore unloaders, to Wellman-Seaver-Morgan Co., 7000 Central Ave. S. E.; coal loaders, car dumpers, to Industrial Brown Hoist Co., 4403 St. Clair Ave. Est. $6,000,000. Noted June 6.

GAS PIPE LINE—Texas and Mexico—United Gas Co., c/o Moody-Seagraves Co., Esperson Bldg., Houston, furnishing 125 mi. 12 in. welded pipe for gas pipe line between point in middle of Zavala Co., to Monterey, Mexico, to Youngstown Sheet & Tube Co., Stambaugh Bldg., Youngstown, O., laying pipe line, to Smith Bros., Inc., c/o Plaza Hotel, San Antonio, $2,500,000.

HYDRO-ELECTRIC DEVELOPMENT — Aberdeen, Wash. — Western Washington Electric Light & Power Co., Stuart Bldg., Seattle, (subsidiary of Federal Light & Traction Co., 52 Williams St., New York), hydro-electric development on North River, Pacific Co., serving Grays Harbor and Willapa Harbor Dists., incl. dam, 120 ft. high, 400 ft. long at crest, 7,600 acre reservoir, generator units, 40 mi. 66,000 volt transmission line, to Sanderson & Porter, 52 William St., New York. Est. $3,500,000. Contractors will take bids on materials in about 6 months.

ELEVATOR—Vancouver, B. C.—Buckerfields Ltd., Rogers Ave., elevator addition, to Northern Constr. Co. & J. W. Stewart, 736 Granville St., $100,000.

SWIMMING POOL — Hamilton, Ont. — City Parks Bd., C. V. Langs, chn., City Hall, concrete swimming pool, to J. Earle Smith Constr. Co., Hamilton, $70,000; filtering equipment, to W. J. Westaway Co., Main St. W.; heating and plumbing, to W. Newell, $23,000. Noted Jan. 10.

OIL TANKS—Toronto, Ont.—McColl-Frontenac Oil Co., Commissioners St., one 80,000 bbl. and other 10,000 bbl. steel oil storage tanks, foundations, day labor. $60,000. Private plans.

Materials

Proposed Work

PORTLAND CEMENT—Arkansas—State Hy. Comn., Little Rock, rejected bids June 19, 1,300,000 bbl. portland cement for bridges. C. S. Christian, Little Rock, hy. engr.

CEMENT—Muskegon, Mich.—City will purchase in open market 6,000 bbl. cement.

Bids Asked

SAND and GRAVEL—Mobile, Ala.—July 15, by Mobile Co., sand and gravel for paving impvts. 5, 6, 8, 9, 10, 11, 14, 17 and 20. A. D. Davis, chn.

SEWER PIPE—Chicago, Ill.—July 8, by City, City Hall, sewer pipe, fittings at city pipe yards required by Bureau Eng. during period ending Dec. 31. R. W. Wolfe, comr. P. Wks.

POSTS, etc.—Iowa—July 8, by State Hy. Comn., Ames, one hundred nineteen thousand 6½ ft. steel snow fence posts. R. F. White, hy. comr.

LEAD PIPE, etc.—Cleveland, O.—July 5, by City, lead pipe, series multiple transformers.

LIGHTING SYSTEM EQUIPMENT — Geary, Okla.—City in market for equipment for 40 post electrical "White Way" lighting system, $5,500. O. P. Roth, Geary, engr.

PIPE—Providence, R. I.—July 8, by City Bd. Contr. & Supply, 31,000 lb. lead pipe, 25,000 pig pipe.

BELT CONVEYORS—Sorel, Que.—MacDonald Eng. Co. Ltd., R. Shoemaker, supt., in market two 48 in. longitudinal reversible belt conveyors, four 48 in. belt conveyors, large quantities rubber belting, standard 32 oz. 16 2/3 friction width, 1/40 rubber surface, conveyor belts 4 ply, leg belts 6 ply, marine lifter belts 7 ply and marine leg belts 8 ply.

Bids Received

STREET SIGN FRAMES, etc.—**New York, N. Y.**—H. Bruckner, pres. Bronx Boro, Crotona Park, 3rd and Tremont Aves., June 27, from Cavanaugh Bros., 300 c.i. street sign frames, $3,489; from Ames Building Material Co., 3441 Kingsbridge Ave., 1,000 cu.yd. paving sand $1,900, 5,000 bags cement $3,063, 3,000 cu.yd. sand grit $8,700; from Warner Quinlan Co., 79 Wall St., 150,000 gal. asphaltic cement $6,840; from Barrett Co., 17 Battery Pl., 100 tons pitch joint filler, $2,300. Noted June 20.

Contracts Awarded

AGGREGATE—Muskegon, Mich.—City, 3,000 tons fine and 6,000 tons coarse aggregate, to Dolomite, Inc., Penobscott Bldg., Detroit, $10,950.

ASPHALTIC CEMENT, etc.—**Brooklyn, N. Y.**—J. J. Byrne, pres. Brooklyn Boro, Boro Hall, 250,000 gal. asphaltic cement, to Standard Oil Co. of New York, $11,500; 2,000 tons inorganic dust, to New York Trap Rock Co., 250 Park Ave., New York, $12,360; 3,000 cu.yd. sand, to M. F. Hickey Co., foot 6th St., $3,900; 5,000 bbl. cement, to S. B. Duffy, $12,150. Grand total $39,910. Noted June 27.

ASPHALT CEMENT—New York, N. Y.—J. Miller, pres. Manhattan Boro, Municipal Bldg., 700,000 gal. asphalt cement, to New York Trap Rock Co., 250 Park Ave., $23,080; 4,000 net tons inorganic dust, to Warner Quinlan Co., 2 Park Ave., $32,480. Noted June 27.

PAVING BLOCKS—New York, N. Y.—P. J. Dooling, comr. Purchase, Municipal Bldg., granite and wood paving blocks to Dpt. Plant & Structures, to Ray Mont Products Co., 137 West 25th St., $10,681. Noted June 20.

Foreign

Mexico, Agua Caliente—W. G. Bowman Interests, Agua Caliente, grading, heavy excavation, drainage, buildings, etc., to Yglesias Bros., Calexico, Calif., $200,000.

See proposal advertising on page 154.

Constr. News page 11

UNIT PRICES

Unit Price Lists Published in June, 1929

		Issue of
Bridge	Montana	June 6
Bridge	Kentucky	June 27
Foundations for Filtration Plant	Detroit, Mich	June 20
Relocating Subway Tracks	Philadelphia, Pa.	June 13
River Tunnel	Detroit, Mich	June 27
Road	Pennsylvania	June 27
Sewerage System	Roxbury, N. Y	June 6
Sewage Treatment Plant	Cleveland, O.	June 20

Road—Kentucky

State Highway Commission, Frankfort, opened bids Apr. 19, grading and draining 5.298 mi. Campbellsville-Greensburg Rd., 24-30-ft. wide, F. A. Project 190-AG, Taylor Co. Bidders are: (A) Combs Construction Co., 200 Desha Rd., Lexington, (awarded contract); (B) Tevis & Ingram, Danville; (C) E. A. Chilton & Co., London.

	A	B	C
39.19 acres clearing and grubbing	$10.00	$8.00	$7.00
52,128 cu.yd. excava.—common	.33	.37	.40
6,973 cu.yd. excava.—solid rock	.80	.80	.60
1,669 cu.yd. excava.—common borrow	.33	.37	.40
293 cu.yd. excava.—for structures	1.00	1.00	.80
2,000 cu.yd. removing unclassified slides	.20	.30	.40
21,476 yd. sta. overhaul	.02	.03	.035
280 sta. final dressing	3.00	4.00	3.00
22 sq.yd. removing sidewalks	1.00	.10	.60
50 lin.ft. relaid pipe	.50	.25	1.00
100 lin.ft. removing pipe	.50	.25	.70
7 cu.yd. removing conc. masonry	1.00	1.00	3.00
300 lin.ft. 15 in. corrugated metal pipe	2.25	1.75	2.00
50 lin.ft. 24 in. corrugated metal pipe	3.25	3.00	3.00
388.61 cu.yd. Class A concrete	19.00	18.00	18.00
25.00 cu.yd. riprap	3.00	4.00	5.00
27,200 lb. reinforcement steel	.05	.055	.045
1,038 lin.ft. 18 in. first-class pipe	2.25	1.75	1.75
84 lin.ft. 24 in. first class pipe	3.50	3.00	2.75
Working days at $60.00 per day	100	120	70
Totals (not including time charge)	$38,075	$39,835	$39,898

Engineering News-Record, Issue of July 4, 1929.

Power Tunnel—Seattle, Wash.

Board of Public Works opened bids May 24, 2,000 ft. concrete lined tunnel from Diablo Dam across Skagit River to site of proposed power house. Eight bids were received, difference between lowest and average, 19 per cent. Lowest three and highest bidders are: (A) Rumsey & Jordan, Lumber Exchange Bldg. (awarded contract); (B) J. M. Clapp; (C) Morrison & Knudsen; (D) Winston Bros. W. D. Barkhuff, city engineer.

	A	B	C	D
1,980 cu.ft. tunnel excav.	$110.00	$100.00	$110.00	$147.00
4,800 cu.yd. incline trench	4.00	3.00	3.50	6.50
9,504 cu.yd. conc. lining A	14.00	15.25	14.00	17.75
591 cu.yd. conc. lining B	14.00	15.25	16.00	20.00
591 cu.yd. conc. lining C	14.00	15.25	14.00	20.00
1,200 cu.yd. lining under trench	10.00	12.25	14.00	20.00
66,715 lb. No. 1 steel	0.07	0.054	0.05	0.054
500 bbl. cement grout	4.00	10.00	7.00	10.00
60 cu.yd. sand grout	20.00	20.00	7.00	8.00
500 lin.ft. 2 ft. grout pipes	.50	1.00	.60	1.50
200 lin.ft. drill grout holes	2.00	3.00	2.00	4.00
9,290 cu.yd. excav. serge tank	3.00	6.25	7.00	9.50
650 cu.yd. conc. lining	10.00	15.25	20.00	24.50
1 acre clearing	500.00	300.00	500.00	250.00
1 acre grubbing	500.00	300.00	500.00	500.00
4,500 cu.yd. excav tunnel portal	2.00	2.70	3.50	4.75
980,000 lb. riveted steel pipe	.08	.099	.09	.10½
10,000 cu.yd. earth excav.	.30	1.00	1.00	1.90
6,000 cu.yd. rock excav.	2.00	3.65	2.50	4.75
Totals	$544,894	$610,609	$618,122	$825,934

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Conduit—Albany, N. Y.

Board of Water Supply, 100 State St., opened bids Apr. 24, furnishing and laying pipe for 48-in. supply conduit from Alcove Dam to filter plant and from filter plant to Norman Kill. Proposal "A" furnishing pipe—(A) United States Cast Iron Pipe & Foundry Co., Burlington, N. J., (awarded contract); (B) Herbert Kennedy Co., New York City. Proposal "B" hauling and laying pipe, using lead—(A) Pepper Bros., 200 East Florence St., Syracuse, (awarded contract); (B) Provo Bros., Syracuse; (C) S. J. Groves & Son, Dormansville. Proposal "C", using leadite. Whitman, Requardt & Smith, 18 East Lexington St., Baltimore, Md., engineers. R. E. Horton, Voorheesville, consulting engineer.

PROPOSAL "A"	A	B
7,530 ton 42 in. and 48 in. B. & S. c.i. pipe class B	$37.40	$39.55
18,430 ton 42 in. and 48 in. B. & S. c.i. pipe class C	37.40	39.35
10,130 ton 42 in. and 48 in. B. & S. c.i. pipe class D	37.40	39.35
40 ton 6–36 in. B. & S. c.i. pipe classes B, C, D	37.40	39.35
188 ton B. & S. c.i. specials class B	110.00	120.00
300 ton B. & S. c.i. specials class C	110.00	120.00
187 ton B. & S. c.i. specials class D	110.00	120.00
265 ton c.i. flanged pipe and specials, classes B, C, D	120.00	130.00
Totals	$1,457,312	$1,537,165

PROPOSAL "B"	A	B	C
57,070 ton unloading and hauling c.i. pipe and specials	$5.00	$4.80	$3.00
34,825 ton distributing, laying and jointing B. & S. c.i. pipe	4.90	5.20	5.00
656 ton distributing, laying and jointing B. & S. c.i. specials	12.00	7.00	12.00
209 ton distributing, laying, and jointing flanged pipe and specials	15.00	7.00	12.00
Testing pipe line (lump sum)	10,000.00	22,905.00	18,000.00
76,350 lin.ft. excav. for 48 in. pipe line	2.70	1.95	3.00
2,900 cu.yd. miscellaneous excav.	2.00	1.50	4.00
51,500 cu.yd. rock excav.	3.00	3.00	3.00
15,000 cu.yd. barrow excav.	1.50	1.50	1.00
2,200 cu.yd. excav. below subgrade	2.50	2.00	4.20
800 cu.yd. gravel or broken stone refill	3.00	3.50	5.00
200 M ft., b.m. foundation lumber	40.00	80.00	70.00
9,000 lin.ft. 6 in. underdrain	.25	.50	.80
Hannacrois Stream Crossing Nos. 1, 2, 3, 4, 5, 6, 7, 8, 12, 14, 16, 17, 19, 20, 21, 22, 34, 35 (lump sum)	12,500.00	16,300.00	20,000.00
48 x 24 in. Venturi meter	5,000.00	4,000.00	5,000.00
2 36 in. bevel gear gate valves	1,500.00	1,350.00	1,800.00
1 36 in. spur gear gate valves	1,500.00	1,350.00	1,800.00
16 8 in. gate valves	75.00	85.00	85.00
5 10 in. gate valves	100.00	125.00	95.00
5 12 in. gate valves	110.00	140.00	120.00
5 16 in. gate valves	200.00	250.00	175.00
12 automatic air valves	300.00	250.00	200.00
15 manual air valve installations	30.00	80.00	150.00
13,000 lb. miscellaneous iron and steel	.20	.15	.20
4,250 cu.yd. conc. foundation	10.00	14.00	18.00
490 cu.yd. conc. moderate section	14.00	28.00	30.00
225 cu.yd. conc. thin section	20.00	30.00	35.00
25,000 sq.ft. conc. protection	.04	.05	.05
98 conc. post markers	20.00	10.00	20.00
82,000 lb. reinforcing steel	.06	.08	.06
300 lin.ft. 15 in. vitri. sewer pipe	1.00	2.00	2.00
930 lin.ft. 18 in. vitri. sewer pipe	1.30	2.25	2.50
210 lin.ft. 24 in. vitri. sewer pipe	3.00	3.00	3.50
320 lin.ft. 36 in. vitri. sewer pipe	6.00	5.00	6.00
410 cu.yd. brickwork	30.00	50.00	45.00
109 c.i. manhole frames and covers	25.00	35.00	40.00
Clearing and grubbing (lump sum)	25,000.00	15,000.00	20,000.00
1,000 cu.yd. rip-rap	4.00	6.00	6.00
Furnishing pile driving equipment	3,000.00	1,500.00	1,000.00
1,200 lin.ft. piles 15 ft. or less	.40	.50	.60
1,600 lin.ft. piles 20 ft.	.40	.60	.70
2,000 lin.ft. piles 25 ft.	.40	.80	.80
2,400 lin.ft. piles 30 ft.	.40	1.00	1.00
83 corporation cocks	10.00	25.00	10.00
Cleaning up (lump sum)	1,000.00	3,000.00	2,000.00
Totals using lead	$873,528	$871,486	$910,530

PROPOSAL "C"	A	B	C
34,825 ton distributing, laying and jointing B. & S. c.i. pipe	$2.60	$3.80	$4.50
656 ton distributing, laying and jointing B. & S. c.i. specials	8.00	6.00	11.50
Totals using leadite	$793,593	$822,075	$892,789

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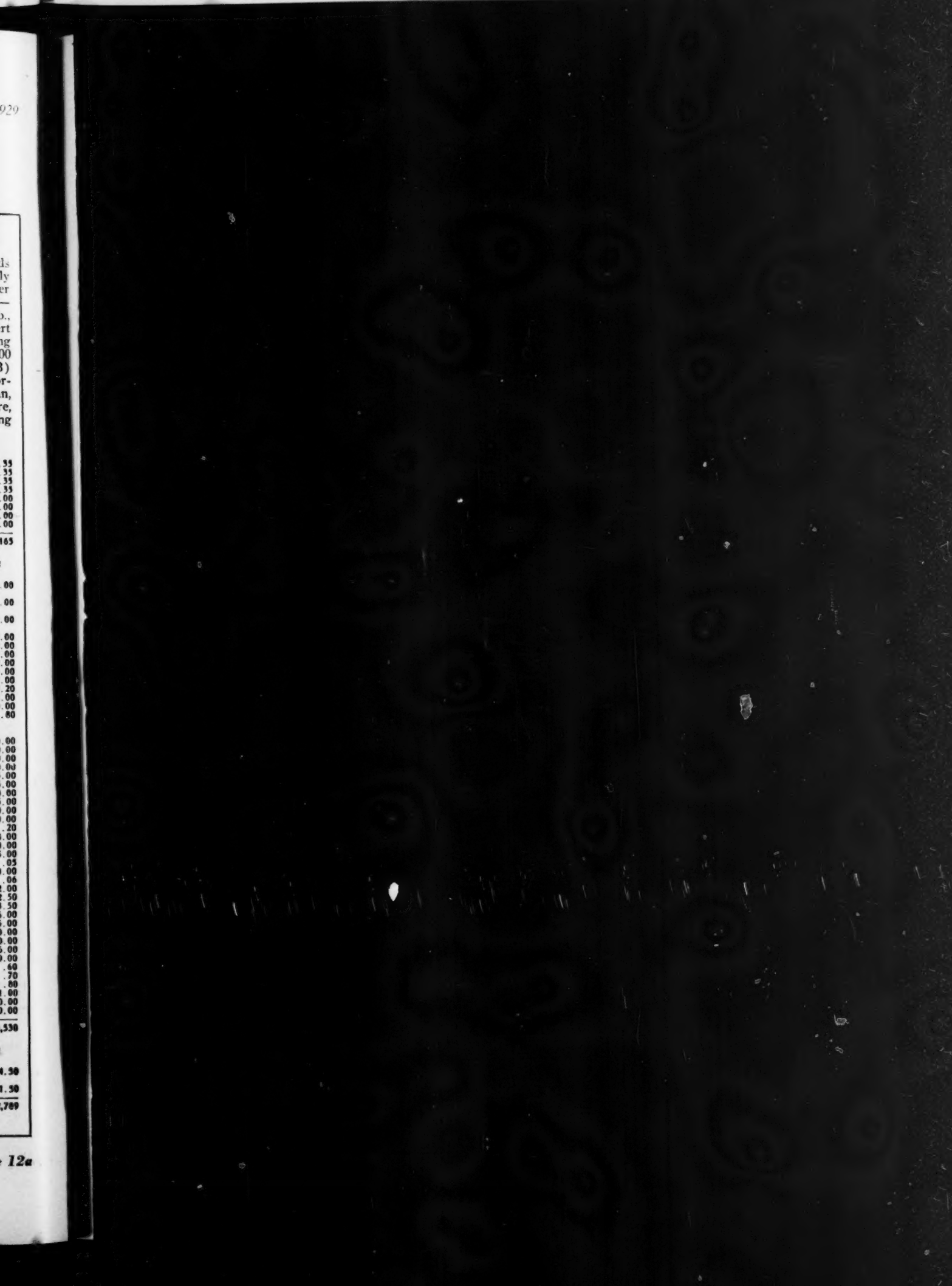
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